ENVIRONMENTAL AFFAIRS CONFERENCE

Vancouver, B.C.
April 30 - May 1, 1991

CONFERENCE REPORT:

DEVELOPING A B.C. CLEAN AIR STRATEGY

BC Environment

Greater Vancouver Regional District

Environment Canada Environnement Canada

Air & Waste Management Association

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ENVIRONMENTAL
AFFAIRS
CONFERENCE

CONFERENCE REPORT:
"DEVELOPING A B.C. CLEAN AIR STRATEGY"

April 30 - May 1, 1991

Simon Fraser University
Harbour Centre Campus
Vancouver, B.C.

Co-sponsored by:

Air and Waste Management Association (AWMA) - B.C. and Yukon Chapter

B.C. Environment - Environmental Protection Division

Greater Vancouver Regional District - Air Quality & Source Control Dept.

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Executive Summary

B.C. Environment is initiating the development of a B.C. Clean Air Strategy with the goal of addressing air quality issues in a comprehensive and systematic way. The strategy was launched at the Clean Air Strategy Conference, held April 30 and May 1, 1991 at Simon Fraser University's Harbour Centre. The conference was co-sponsored by the B.C. Environment, the Air and Waste Management Association (B.C. & Yukon Chapter), the Greater Vancouver Regional District and Environment Canada.

The objectives of the conference were:

(1) to discuss a variety of existing and proposed air quality management initiatives and their coordination within the province and;

(2) to provide a discussion and summary of the issues, options and points of view which should be considered in the public consultation leading to the development of a B.C. Clean Air Strategy.

Day 1 consisted of panel presentations on technical and policy aspects of air quality issues. After B.C. Environment Minister Dave Mercier's announcement of the Clean Air Strategy, conference participants heard about current activities from twelve speakers from government, industry, academia and public interest groups. It was clear from hearing these speakers that there are many initiatives already underway to address B.C. air quality issues. These are summarized in the full conference proceedings.

Day 2 consisted of workshops organized around the topics of economic issues, standards and regulations, energy, forest products, transportation, other industrial sources, and non-industrial sources. The 150 conference participants representing industry, environmental groups, academia, government, business, and community groups, divided into twelve workshop groups. While each workshop focussed on one topic, most discussions covered a wide range of air quality issues. Although participants brought diverse backgrounds and views to the debate, they often agreed on which of the issues were of highest priority. Hence, the discussions focussed on goals, strategies and actions to address the issues. It should be noted that much of the commentary emphasized Lower Mainland concerns due to the predominance of delegates from that region and the high level of concern regarding Lower Fraser Valley air quality issues. However, issues concerning all regions of B.C. will be addressed in the Clean Air Strategy.

Key issues from the conference are summarized in the following pages. Further information on strategy development will be distributed to conference participants and the broader community as soon as it is available.

a. Clean Air Strategy

Participants feel it is urgent that there be a clearly defined process for arriving at a Clean Air Strategy, including proposed goals, products and timetables with provision for stakeholder involvement and public education. They are often frustrated with the lack of government response and want assurance that there exists the political will to act on Strategy recommendations.

b. Jurisdictions and Decision-making

Participants are concerned about the lack of clarity regarding jurisdictions and roles of government agencies in addressing air issues. They urged all relevant agencies to define their roles and to cooperate to resolve issues on a regional airshed management basis.

There was strong support among most participants for a regional airshed management authority for the Fraser Valley, with representation from key stakeholders. Besides responsibility for air quality objectives, standards and regulations, this body should be able to influence regional development and transportation. Similar groups could be developed for other priority airsheds.

There was also strong support for using regional planning to address air issues in the GVRD. The goal is to better integrate decision-making on regional population growth, land use planning, energy and transportation. Restoration of planning powers to the GVRD was proposed.

More research is needed to provide the scientific basis for decision-making. Interdisciplinary research is the key to dealing with complex air problems which must also be addressed in an integrated way so that new problems are not created. Technological innovation is essential to provide other tools besides regulation.

c. Standards and Regulations

Participants largely agreed that B.C. currently lacks a systematic and effective air management strategy. The Clean Air Strategy should outline a clear process for defining and implementing air quality regulations, policies, objectives, standards and permits, in full consultation with stakeholders. Pollution control objectives and criteria should be updated and more work is needed on ambient standards and their relation to Best Available Control Technology (BACT). The goal should be prevention of discharges, working towards "zero" emissions.

Several participants noted that there has been too much emphasis on pollution control and not enough on pollution prevention. Technological development and government regulations should focus increasingly on prevention measures, using a diverse array of approaches, including both "carrots" (i.e. incentives) and "sticks" (i.e. laws/regulations).

Participants also feel that there should be greater enforcement of existing legislation and a willingness to act on problems. B.C Environment needs more resources to develop and enforce regulations. Additional regulatory concerns include pollutant mixes (synergistic effects), toxic air contaminants and unregulated air emissions.

d. Economic Issues and Instruments

Participants identified the need for environment-economy integration in decision-making affecting air quality. The costs of air quality impacts should be considered when assessing new projects (i.e. internalize environmental costs).

Economic instruments are recognized as key tools in achieving air quality goals, yet technical problems remain (e.g. non-quantifiable benefits and costs). More work is needed to develop useful types of economic analysis which address analytical limitations and incorporate stakeholder views. Workshop participants proposed the formation of a working group to research economic instruments, including: their use elsewhere, their effects and issues of equity and fairness.

e. Energy

It was suggested that B.C. needs a systematic approach to energy planning which incorporates environmental factors, including air quality. The Province should examine long-term energy needs, sources and alternatives. It should develop incentives and regulations for energy efficiency, conservation, alternative energy and non-polluting technologies. Energy planning should also be integrated with an economic strategy.

There was general agreement that B.C. should reduce greenhouse gas emissions, using measures such as public education, energy efficiency, energy conservation, fuel substitution, improved technologies and enhancement of greenhouse gas sinks (e.g. forests). Some participants felt that we need to define B.C.'s (and Canada's) share of the responsibility to limit greenhouse gas production. This would involve negotiations with the federal government and development of a B.C. position on national emission caps for presentation at CCME.

One energy workshop also expressed concern regarding emissions from the energy production and transmission sector, especially SO_2, NO_x, but also H_2S, particulates, VOC and ozone. More effective emission and impact monitoring programs were recommended. Cogeneration schemes should be fully assessed to identify net environmental benefits.

f. Transportation

Participants generally agreed on the need to reduce urban sprawl and vehicle dependence through changes in both technology and lifestyle. Efforts should be aimed at reducing emissions per kilometre driven, and reducing total journeys. Vehicle emissions must be reduced through more stringent legislation and regulations combined with incentives to promote low-polluting, fuel-efficient vehicles.

Better regional transportation planning should create a properly integrated, minimally polluting and convenient transportation network. Participants proposed diverse measures to reduce vehicle use, drawing on "Clouds of Change" and ideas from California. These include: incentives for carpooling and vanpooling, high occupancy vehicle (HOV) lanes, expanded park'n ride, and employer transportation plans. We should be shifting our work habits through greater use of innovations such as teleconferencing, telecommuting and nodal offices. Municipal and regional planning should promote new urban forms through measures such as higher densities, decentralized jobs and regional town centres.

It was also noted that the auto lifestyle is highly subsidized. Government agencies were encouraged to adopt full cost accounting for vehicle infrastructure when deciding about transportation options. This may mean greater subsidies to urban transit so that transit infrastructure and services can be expanded. Urban transit agencies should expand their role to include transportation management (e.g. car and vanpooling, bicycle infrastructure and commuter rail). There was widespread support for encouraging greater bicycle use. Despite Vancouver's bicycle advisory committee and bicycle plan, participants felt that more initiatives are needed.

g. Forest Products

One forestry workshop suggested that we need a better understanding of the linkages between forestry practices and global warming, especially the role of forests in the carbon cycle. They recommended more research on this issue and expanded education of the forestry community and the public.

Another general concern from a forestry workshop was how to determine acceptable emission levels from forestry activities. Further applied R & D on air pollution problems, opportunities and alternatives in the B.C. forest industry is proposed.

A specific concern in the forestry sector is burning of slash, teepee and land sort debris and its impacts on the nutrient value of wood, utilization of marginal fibre and soil. Alternative practices and technologies must be explored to maximize energy efficiency and minimize environmental impacts. Other forestry issues include particulate emissions, small scale wood burning for heat and power, and weaknesses in sampling and statistical methods for forestry emissions.

Finally, most participants felt that the Clean Air Strategy is urgently needed and welcomed the opportunity to contribute at the conference. Indeed, one of the strongest messages from participants is their desire for continued involvement in the Strategy development and in on-going air management initiatives.

1.0 The Conference

B.C. Environment is initiating the B.C. Clean Air Strategy with the goal of addressing air quality issues in B.C. in a comprehensive and systematic way. The strategy was launched at the Clean Air Strategy Conference, held April 30 and May 1, 1991 at Simon Fraser University's Harbour Centre. The conference was co-sponsored by the following organizations:

- Air and Waste Management Association of British Columbia (AWMA): B.C. and Yukon Chapter
- B.C. Environment: Environmental Protection Division
- Greater Vancouver Regional District: Air Quality and Source Control
- Environment Canada: Atmospheric Environment Service.

The objectives of the conference were:

1. To discuss a variety of existing and proposed air quality management initiatives, and their coordination within British Columbia.

2. To provide a discussion and summary of the issues, options and points of view which should be considered in the public consultation leading to the development of a Clean Air Strategy for British Columbia.

The conference ran over two days, each of which addressed one of the objectives. **Day 1** consisted of presentations by expert speakers on technical and policy aspects of air quality issues. Each panel of speakers was followed by questions and comments from the audience.

On **Day 2**, participants were divided into twelve workshops, each of which addressed a specific topic and was made up of 6-12 people from diverse backgrounds. This allowed participants to provide individual input, examine various viewpoints and identify areas of consensus and disagreement. Volunteer facilitators in each group helped to focus and record the discussions and a group representative briefly presented the results in the final plenary session.

The following report serves several functions. For conference participants, it provides a record of proceedings. For government staff and others who will design the B.C. Clean Air Strategy, it indicates the issues raised and some views of stakeholders. Although many of the views and comments refer to the Lower Fraser Valley, the intent is to develop a clean air strategy for the whole province. Finally, for anyone with an interest in air quality, it provides an introduction to current B.C. air issues and perspectives.

The rest of the report is organized in three main sections. Section 2 provides summaries of the Day 1 presentations and discussions. Section 3 presents a summary analysis of the main issues raised during the workshops and audience discussions. Appendix A contains the full reports from the Day 2 workshops, Appendix B lists all participants and Appendix C consists of selected background material distributed at the conference.

The conference summarized in this report is the first step in the preparation of a B.C. Clean Air Strategy. Further information on the strategy will be distributed to conference participants and the broader community as soon as it is available, so that the public can continue to be involved in the process. For further information, please contact the Environmental Protection Division, B.C. Environment.

2.0 Day 1: Presentations

The following sections provide summaries of each speaker's talk, based on the speakers' notes, the rapporteur's notes and audio tapes of the sessions. There are occasional errors, omissions or misinterpretations in this account which are unavoidable due to gaps or lack of clarity in the notes and tapes.

2.1 Opening Session

This session was opened by Harry Vogt, Environmental Protection Division, B.C. Environment and Murray Ward of the Air and Waste Management Association (AWMA). The session was chaired by Bryan Williams of the B.C. Round Table.

Mr. Williams described the Round Table as a body which is independent from government and composed of representatives of various sectors of B.C. society. Despite the range of views represented, decisions are made on a consensus basis. The Round Table has produced discussion papers on selected topics, including energy, sustainable communities and sustainable land and water use. They also consult the public as part of designing a B.C. Sustainable Development Strategy.

Mr. Williams stressed that our success in dealing with environmental issues will depend on leadership from groups such as the Round Table, patience and understanding on the part of the public, compromise by industry and environment, and courage by government. He went on to introduce the session speakers.

2.1.1 Dave Mercier: B.C. Environment Minister

The Minister opened by describing a tourism survey of visitors to B.C. which found that U.S. visitors overwhelmingly listed "clean air" as what they liked best about B.C. and Vancouver. He invited us as conference participants to ask ourselves whether we can live up to their expectations and our own.

The Minister noted that the primary purpose of the conference was to begin a process of consultation with the goal of giving B.C. a Clean Air Strategy within one year. He also drew attention to his recent announcement, with the Solicitor General, of the "AirCare" program. It is intended to improve the quality of air in the Fraser Valley through control of motor vehicle emissions in the Lower Mainland. He stressed that the Clean Air Strategy must be more than a government initiative, and that industry and individuals must also help to find solutions, by saying: *"We need the commitment and expertise of all the stakeholders represented here to develop a realistic action plan, to build a firm consensus and to carry it out."*

Finally, the Minister thanked the B.C. and Yukon Chapter of the Air and Waste Management Association for coordinating the conference, and thanked staff of the GVRD, Environment Canada and industry for helping to plan the workshop. He pledged the commitment of B.C. Environment to work with the participants in the coming months.

2.1.2 Doug Drummond: Chair, GRVD Air Quality Committee

Mr. Drummond suggested that we are moving from the "Me Decade" of the 1980's to the "We Decade" of the 1990's, where the needs of, and service to, a greater community dominate decision-making. This need for cooperation is evident in the field of environmental protection, where quality of life must be considered along with the merits of future growth and development.

The Lower Mainland Airshed in the Fraser Valley is a good local example of this interconnectedness. It is a complex coastal valley, whose topography and climate combine to increase air contaminant levels. Since decisions in one part of the airshed are felt across the entire valley, there is a need for integrated airshed management, as advocated in the 1972 Lower Mainland Air Quality Study. In two comparable opinion surveys done in 1973 and 1990, "Air Pollution from Industry" topped the list of public environmental concerns, with "Air Pollution from Automobiles" following closely.

Under the GVRD Air Management Plan, begun in 1988, emission and air quality levels have been projected over the next 20 years, using a conservative annual growth rate of 1.5%. The projected growth in emissions of particulates, SO_2 and NO_x are expected to offset decreases from improved auto emission control technology. Present ozone levels are expected to continue to regularly exceed federal air quality objectives. Actual conditions could be worse since actual regional growth rates are higher than those used in the models.

Mr. Drummond noted that the 1989 Los Angeles Air Quality Management Plan demonstrates the scope of possible solutions to urban air pollution. It identifies three tiers of technology, ranging from Tier I - today's best, to Tier III - now only in the conceptual stage. Tier I controls are expected to result in daily costs to society of $0.60 per capita, which will be offset by the predicted health and environmental benefits of $1.60 per person. Lower Mainland benefits would be similar, but would also contribute to goals such as stewardship over the fertile Fraser Valley lands and prevention of the serious pollution situation that exists in L.A.

The Los Angeles Tier 1 program includes initiatives which touch all aspects of the lives of its citizens, from personal deodorants and barbecues to urban transit and auto tire purchases. Efforts in the Lower Mainland should consider a similar scale of interventions, as Tier I involves only the application of <u>current</u> control technology. Measures should include controls on industry, but also voluntary and regulatory initiatives for citizens. Transportation management options and land use policies should be assessed to reduce total travel demand and reliance on private vehicles.

To better manage the airshed, there should be improved coordination between B.C. and Washington State, and better cooperation among Canadian regulatory agencies. One option would be implementation of an overall airshed strategy by a single agency, which could be a provincial or regional district agency or a new agency, possibly subject to some kind of public control. The Northwest Air Pollution Control Authority is a tri-county agency providing coordinated air quality control on the U.S. side. While Canadian agencies have carried out joint studies, further cooperation has been difficult to maintain due to "the fluctuating priorities of the various jurisdictions". While agency coordination should continue, a single consolidated program offers the most promising option for the sustained management of airshed quality.

Mr. Drummond emphasized the importance of *cooperation, competence* and *commitment* for airshed management programs. *Cooperation* is needed among agencies involved in transportation and development planning, as they affect air quality. Local communities also need to be involved in developing air programs to gain public support. *Competence* in the sense of strong technical, political and administrative maturity and experience is needed to assess the choices for the future. The *commitment* to airshed management must be long-term, considering 10 and 20 year horizons and global concerns for future generations. An airshed management agency must be able to adapt to new technologies and sustain itself through economic shifts.

The GRVD Air Quality program has well-established regulatory and monitoring activities. Its Air Management Plan is evolving in response to the goals proposed in the document "Creating Our Future" (1990) and approved by the GVRD Board. Substantial new resources have been allocated to the Air Quality function (budget up 40% in 1991) and the new Air Quality Committee of the Board will continue to be active.

2.1.3 Larry Bell: Vancouver Board of Trade Environment Task Force

Mr. Bell began by recounting his own experience in B.C. Hydro dealing with a permit for the Burrard Thermal Plant. He noted that the argument often used by project developers that there is "no scientific proof" of certain negative environmental impacts is a "null hypothesis" that we cannot "hide behind" because the argument is not credible to those with common sense. Instead, we must acknowledge that economic activity "consumes" the environment and try to make the real trade-offs that are necessary.

The Board of Trade Environment Committee visited the 10 largest industrial emitters and found that there had been a 30% reduction in emissions over 1986-1991. Current plans will result in a 300% decline. Mr. Bell suggested that focusing on the big users will be bad for the economy *and* may miss some of the real problems. On the other hand, we are not as aware as we should be about what is already lost. For example, many of us are not aware that 80% of certain GRVD pollutants are produced downtown, since on-shore breezes take them up the Fraser Valley.

He sees a real attitude change within industry, as illustrated by a Chevron refinery in L.A. that closely monitors all aspects of its operations, including random vapour escapes, in order to survive in its location in a wealthy Los Angeles neighbourhood. But, "since clean air is a right and an obligation for all of us", we need to deal with issues such as the fact that for every 1% increase in population, there is a greater than 2% increase in the miles driven (L.A. statistics). Transit and town planning approaches are essential. For example, L.A. requires all companies over 50 employees to file an employee transportation plan.

Mr. Bell concluded by saying we must get away from "the Canadian tradition of substituting debate for action". We need an approach which: (1) provides a clear basis for environmental protection ("uncertain and capricious regulations are unacceptable"); (2) reinforces a "we" approach; and (3) establishes an "Airshed Management Board" which is self-funding and takes a "soft" approach (i.e. advisory). We must take advantage of the 10-year window that improvements in auto technology have provided.

2.2 The Issues Before Us

2.2.1 Global Issues

Dr. Gordon McBean: Chairman, UBC Atmospheric Science Programme

Dr. McBean noted that global climate change is one of the major environmental issues facing the world today. Current climate models predict that the climate could change more in the next century than it has over the past 8000 years. The effects of such rapid change would be devastating to many ecosystems; at the same time, sea level rise would threaten many low-lying countries. The Earth's climate has changed significantly in the past due to natural factors. It is known that our present climate is about 30° C warmer than it otherwise would be due to presence of small amounts of water vapour and CO_2 in the atmosphere. These gases, through selective absorption of radiation, essentially trap heat energy in the lower atmosphere and warm the surface. This natural "greenhouse" effect makes life, as we know it, possible on this planet.

Human activities over the past few hundred years have increased the atmospheric concentration of CO_2 by 25%; concentrations of other greenhouse gases (methane, chlorofluorocarbons and nitrous dioxide) are also increasing. Projections for the next 100 years, based on limited understanding of carbon and other cycles and estimates of future energy and socio-economic scenarios, indicate that greenhouse gas concentrations will effectively double sometime after about 2025.

Scientists have data to assess atmospheric change over the last 100,000 years. Global temperatures and atmospheric CO_2 levels have varied considerably; however, while current CO_2 levels parallel those around the time of the Ice Ages, the level has never exceeded about 300 parts per million (ppm). Current levels are around 350 ppm, representing a 25% increase since the Industrial Revolution, when levels were around 280 ppm. Dr. McBean noted:

> Even without a great amount of scientific understanding and detailed calculations, one could argue that if the greenhouse effect due to CO_2 and water vapour has increased our temperature by 33° C naturally and we have now added about 25% additional CO_2 to the atmosphere, it seems very likely that the climate will respond in some way and presumably warm. The big question is "How much and how quickly?"

Over the past 100 years the climate has warmed about 0.5° C, which is still within the range of natural variability. The major question is: How will the Earth's climate respond to increasing greenhouse gas concentrations over the

next 100 years? Our only prediction tools are global climate models providing computerized simulations of the Earth's climate. These models have deficiencies, notably in their treatment of clouds and the oceans. To a large extent, the interactions of water and energy in the atmosphere and at the surface (clouds, radiation, snow and ice) determine the sensitivity of the climate system, while the oceans determine the rate of change.

Our best models indicate a sensitivity of between 1.5° C and 4.5° C for doubled CO_2 concentration. The large range is due to uncertainty in our understanding of the role of clouds and the delay due to the role of the oceans as a buffer. The Scientific Assessment Working Group of the Intergovernmental Panel on Climate Change concluded that a warming of 0.3° C per decade, with an uncertainty of 0.2 to 0.5° C per decade, over the next 100 years, should be expected if emissions continue to increase as in the recent past (the Intergovernmental Panel on Climate Change, (IPCC) Scenario A, sometimes called the "business as usual" scenario). It is notable that, even if we could achieve reduced emissions, the long lifetime of these gases means that there will continue to be a rise in temperatures.

There will be major regional variations in this warming with the high northern latitudes warming most, particularly in winter. Precipitation will also change. For example, temperature rises could be as great as 8° C in central Canada. While temperature rises may be less than average in B.C. due to the ocean influence, increases in precipitation could occur, while decreased precipitation could be expected in Canada's grain areas.

These changes raise socio-economic policy issues as much as they do scientific ones. Current initiatives include the Ministerial Declaration at the November 1990 World Climate Conference, the National Action Strategy in Canada's Green Plan and the Canadian Network for Global Environmental Modelling (CANGEM).

It is important that scientific activities be undertaken to reduce the uncertainty in these simulations. At the same time, appropriate actions should be taken to reduce emissions of greenhouse gases to the atmosphere. Since the climate is still expected to warm due to past emissions and expected future emissions by many countries, it is important to combine a policy of emission reduction with a strategy of active adaptation. To develop the proper strategies, greatly improved predictions of climate change are needed. However, it is important to act despite the uncertainties.

Climate change, due to increasing concentrations of greenhouse gases, is linked to other global atmospheric environmental issues. Chlorofluorocarbons, the major cause of ozone layer depletion, is also a major greenhouse gas. Nitrogen oxides play a role in climate warming, as do ozone layer depletion and acid rain, and local pollution problems. While in many cases the pollutants compound each problem, there are instances where

they act in opposition. For example, recent evidence is that sulphate aerosols may be whitening clouds, cooling the climate. Each of these issues is complex and efforts to counter one issue in isolation should be avoided. A comprehensive approach to atmospheric environmental issues is needed.

2.2.2 Regional Issues

Dr. Bill Rees: UBC School of Community and Regional Planning

Dr. Rees began by characterizing our view of ecological issues in the 1960's and 70's as: (1) primarily of local concern (e.g. pulp mills in B.C.); (2) clearly linked to specific causes (e.g. factories); and (3) focussed on technological fixes and simple solutions. In contrast our current major problems are: (1) mostly global; (2) resulting not from specific industries, but as by-products of our way of life and cumulative effects over time (e.g. ozone depletion); and (3) without easy technological fixes since problems are so pervasive.

Current problems, such as CO_2 and climate change, are often characterized by lags and thresholds. Because the full effects may not be apparent for years or decades, politicians hesitate, putting off the hard decisions. A primary example of this is CFC's, where emissions can take 10 years to reach the stratosphere. Even if we were to act immediately, the ozone situation would likely get worse for at least a decade. This presents a political dilemma - those who need to act may be subject to a negative reaction, they may not get any positive political payoff, nor will they be accountable in the long run.

It is estimated that the global ecosystem is capable of absorbing about one half of the anthropogenic emissions that are presently produced. Canadians produce about 4-5 times the amount of emissions per capita than what they would be allowed to produce if emissions were allocated globally on an equitable per capita basis. Yet, it is difficult for senior governments to respond to our need to reduce emissions because of the political inertia noted above and the fact that agencies such as the Department of Energy see their role as "maintaining the existing industrial infrastructure". They are subject to lobbying from their perceived "constituencies" in our hydrocarbon-based economy (e.g. petroleum industry, automotive industry).

Dr. Rees went on to note that there is an important role for people at the municipal level in facing these global issues. Most people live in cities, thus many of the pollutants are produced there. Also, local and regional governments tend to be more responsive to local constituents and less subject to lobbying by specific interests. Faced with the lack of a satisfactory federal response to global issues, Dr. Rees collaborated with some local politicians

and citizens in establishing the Vancouver City Council Task Force on Climate Change.

In June 1991, the Task Force produced the "Clouds of Change" report, which aims to establish a leadership role for Vancouver and the region in addressing global climate issues at a local level. It includes 34 recommendations, discusses background issues and presents sample ordinances from other jurisdictions. A slightly modified version of the report was adopted by Council and has stimulated response from various City departments. For example, proposed developments are now reviewed to identify air quality implications.

Dr. Rees noted that it is insufficient to simply identify causes and effects of specific air problems without examining related issues such as transportation, land use and density. Vancouver uses twice as much gasoline per capita for commuting than European cities, which are more compact. Changes to transportation systems are related to the issue of how to densify certain areas of cities. Other measures include requiring employee transportation plans from employers or Stockholm's requirement that cars display a transit pass to drive downtown, thus encouraging a switch to transit.

The City of Seattle will buy a mini-van for groups of commuters and is also using HOV (high occupancy vehicle) lanes. This is proving to be cost-effective, even without considering the environmental benefits. Since the city is so spread out, it is cheaper than expanding bus service. Many other studies have identified the potential for similar savings. If such measures are adopted, Dr. Rees suggested, in 30-40 years, we can have more efficient cities which are also cleaner, healthier, more accessible and offer higher food security.

Dr. Rees concluded by noting that increasing attention is being paid to "the precautionary principle", which says that: *"...the risks and hazards of not acting far outweigh the cost of acting affirmatively and sensibly to head off some of the changes that are likely to occur, even if we don't know what these are.'"*

Scientists agree that primary changes in climate are occurring; it is only secondary variables that are in question. Current scientific disputes are focused only on the *degree* of change. It is a good ecological rule that the probability of these macro-scale changes being negative is greater than that of a positive outcome for human society. Thus, the precautionary principle is key.'

Questions and Comments:

An unidentified person raised a question about ozone depletion figures. Dr. Rees responded that, based on NASA satellite data, levels of ozone depletion seem to be higher over North America than originally thought. Statistics are controversial, but ozone levels have decreased at least 5% worldwide over the last decade, and depletion could be up to three times as bad in some areas. Many facts are discovered through hindsight analysis since models are often weak in incorporating feedback mechanisms which complicate the actual situation.

Dr. Douw Steyn of UBC wondered how we can expect to deal with our current complex problems, given our lack of solutions for the simpler problems of the 1960's and 1970's. Dr. Rees responded that the issues are not technical, rather, there is a lack of political will and public understanding. Much of the technology is available or could be made available. Individuals must express strongly to politicians their views that action should be taken.

David Martin, Alberni Environmental Coalition, asked what "Clouds of Change" says about bicycles. Dr. Rees noted that they are addressed as an integral part of the strategy.

Dr. Tom Perry, NDP Health Critic, noted that politicians get relatively little political push for environmental reform. They cannot plan to deal with problems 40-60 years down the road because they don't have the power; it has to come from the public. Given the magnitude of the air problem, "there is virtually no public pressure".

2.2.3 Local Issues

Calvin Sandborn, West Coast Environmental Law Association

Mr. Sandborn suggested that it is debatable whether or not humans are really rational beings. He chooses to be optimistic and feels that we will respond to the environmental crisis, realizing that it is a matter of survival. He reviewed a range of environmental problems, including air issues such as ozone damage to crops in the Fraser Valley and the elevated SO_2 levels in some B.C. communities, which are correlated with hospital admissions for respiratory problems.

We must avoid the mistake of the last 25 years, which is to focus on pollution control, accepting the existence of a polluting car or factory and then adding "gizmos and gadgets" to capture the pollution. Despite new laws and costly strategies, we have made little progress in reducing air pollution problems. Pollution control improvements which reduce unit emissions have been

overcome by the increased number of polluting devices. Mr. Sandborn referred to Barry Commoner's observation that measures for pollution prevention have been more successful than those for pollution control. For example, real improvements have resulted from the complete banning of DDT, PCB's, mercury, strontium 90 and lead in gasoline.

We can move towards pollution prevention using measures such as California's Air Resources Board requirement for 10% non-emitting autos by 2003 and other recommendations in "Clouds of Change". Massachusetts requires every large polluter to hire a toxic use production expert to replace toxic feedstocks (i.e. inputs to production). These experts develop closed-loop systems which recover wastes such as heavy metals and solvents, thus illustrating Buckminster Fuller's idea that pollution is "resources that we aren't harvesting". The state proposes a 50% reduction in hazardous waste production by 1997.

Private industry often leads the way in prevention measures; the 3M Company has cut its hazardous waste by more then 50% and saved $500,000 U.S. There is increasing evidence that companies make money by implementing such measures. Governments can also have an impact by changing purchasing policies (e.g. use of electric cars and photovoltaic cells would help bring their cost down through encouraging economies of scale).

Mr. Sandborn suggested that current federal and provincial processes for environmental assessments of new plants are inadequate. Provincial processes do not require public input in major project reviews, there is no assessment of policies and programs and there is no intervenor funding. The proposed federal assessment legislation (Bill C-78) narrows the range of projects which would be subject to assessment and does require statutory assessment of policies and programs, such as the trilateral free trade agreement. For example, there is no assessment of the decision that, this year, $677,000,000 will be spent on fossil fuels and nuclear development while only $35,000,000 will be spent on energy efficiency (down from $410,000,000 in 1984). There is intervenor funding for public groups to hire scientists, but not lawyers, yet lawyers are used by the proponents.

There needs to be routine enforcement against polluters. While total fines are rising rapidly due to public pressure, many companies pay fines and still profit. We have to change the economic equation "to ensure that polluters don't prosper and that clean industries do". We should use emission charges, administrative fines (to avoid courts) and tax differentiation schemes (e.g. tax the "gas guzzlers", rebates for the "gas sippers"). Much is at stake.

Questions and Comments:

Lenore Herb, President of Society Promoting Environmental Conservation (SPEC), noted that environmental groups belong to a wide international network and have both expertise and case studies to offer in debating new projects. Mr. Sandborn agreed, but noted that environmental groups often face numerous hired experts on the industry side. Ms. Herb also asked about the draft protocol for delisting special wastes, noting that emission objectives for incinerators are based on Best Available Technology. "Why aren't we directing ourselves to eliminating emissions rather than allowing incinerators? Why do we change standards to accommodate increasing pollution and why is deregulation the answer to toxic pollution?"

Bruce Torrey, Policy Chair for the Liberal Party, asked the two UBC professors what percentage of UBC's budget is devoted to public education. Dr. McBean noted that there have been some public events, but that he is sometimes frustrated that the public may hear about the issues, but not change their behavior. Dr. Rees noted that there is no incentive within the university system of rewards for involvement in public policy issues. There is an ethic which discourages involvement in issues of values.

Ed Chessor, an engineer with Workers Compensation Board, noted that demanding Best Available Control Technology provides an incentive for engineers to find alternatives to hazardous materials. Mr. Sandborn agreed, but feels we need to move away from using toxics and towards standards of "lowest achievable emissions". Dr. Rees added that we will need new production processes which do not use toxics, if we are to meet the increased levels of industrial activity needed to offer a decent standard of living for growing populations.

Contrary to some speakers, Dr. David Bates of UBC feels that there is a great deal of public concern regarding air pollution in the Lower Mainland and throughout Canada.

Dermot Foley of SPEC noted our tendency to look at one pollution issue at a time. For example, we are promoting more efficient wood waste burners to reduce particulates but are not considering the resulting increased CO_2. Risk assessment often considers one chemical at a time, ignoring interactions. Dr. Rees suggested that this is symptomatic of the reductionist nature of western science. This partial approach often leads to competing theories, which resulting in the "ideological selection of scientific theory to support the status quo". Yet global and ecosytemic issues require more holistic science as a basis for policy and action.

Dr. McBean responded that progress has been made towards more integrated science, with increasing cooperation among scientists such as biologists, chemists and climatologists in programs like the international Biosphere and

Geosphere programs. Social scientists are working with natural scientists in the "Human Dimensions of Global Change" program. While the scientific community was slow to discover ozone depletion, they are now leaders in drawing attention to the issue of climate change. Dr. Rees also noted problems with "bad science", which is discredited by the academic community, but picked up by politicians when it suits them (e.g. the Marshall Institute work on global climate change).

Dr. Tom Perry spoke of the lack of public support for an attempt (unsuccessful thus far) to convert proposed luxury housing on UBC lands to residential development for UBC students and staff in order to reduce commuting.

2.3 Larry Berg, South Coast Air Quality Management Board (Los Angeles)

Mr. Berg began by asking why it is so difficult "to create a place where the air doesn't affect your health" and why there is such a debate over costs. He went on to describe the AQMB (Air Quality Management Board) which is the implementing agency for the State and Federal Clean Air Acts. It uses no tax revenues, but is funded by permit fees, emission fees and fines. Board membership includes nine locally appointed officials and three community members, with seven votes needed to approve an initiative. They are responsible for the air of 13 million people spread over 13,000 square miles.

Emissions in the L.A. Basin have decreased by 30% since the late 1970's with 1990 the best year since records began 30 years ago. Current issues include air toxics, of which 60% come from the 9 million motor vehicles in the region. Based on his experience, he noted that Greater Vancouver's ozone levels should be cause for concern.

The most important turning point was the growth of public awareness. In the 19th century, attention first focussed on public health; the separation of sewers from drinking water was likely more important than the medical advances of the period in improving health. The work of Dr. David Bates and others have "closed the public health loop", showing that "dangerous chemicals in the air are not good for you". Research on ozone has shown negative impacts on human lung capacity; in parts of Los Angeles, the lung capacity of children was reduced by 15-20% while, in the most polluted areas of Houston, there were reductions of up to 75% in otherwise healthy people. Other research shows that irreversible lung damage can reduce an individual's life span. It is clear that ozone build-up has measurable human costs.

Mr. Berg suggests that U.S. federal standards do not protect public health. Yet it is public health concerns which are currently driving the technology. We must realize that it will be physically impossible to continue to have the

kinds of cars and fuels used now. Government needs to set the standards which influence the technology. The Board announcement two years ago that they would move towards zero emissions spurred improved technology among American manufacturers who feared competition from overseas. One example is the multi-billion dollar consortium of auto makers who are cooperating to develop batteries, fuel cells and dedicated natural gas and methanol vehicles (i.e. not conversion). Lower emission cars and fuels are available in some regions; why can't we get them everywhere?

The California Air Quality Board regulates the vehicle and fuel as an integrated system. It aims to have 15-20% no-emission vehicles by 2007, and has recognized that, in the long run, such standards cannot be reached with the internal combustion engine. It has developed stringent rules for four stages of new vehicles: (1) transitional low emission vehicles; (2) low emission vehicles; (3) ultra low emission vehicles; and (4) zero emission vehicles. There is already an existing or pending technology and fuel for each of these.

Mr. Berg emphasized that the public supports L.A.'s initiatives, as demonstrated by the 21,000 calls per month to the 1-800-SMOG number to report smoky vehicles. A letter is sent out to the offenders and 25% of them have written back, thanking the Board for the reminder! He dismissed the argument that the public won't pay by pointing to the significant net health costs savings from pollution clean-up. He also noted that car manufacturers experienced considerable cost savings in past years when standards were less stringent.

He concluded that there is growing public awareness of planetary ills and our role in them. For example, L.A. produces 3% of the global warming emissions in the world! If we can get to the point where we breathe healthy air, it will represent a leap such as was made when we separated sewers from drinking water. We should do it "because it's the right thing to do".

In response to a question about the role of urban planning in L.A.'s efforts, Mr. Berg noted that he is unsure of the agency's capability to influence planning, given the land use powers of local authorities. However, they do review proposed new developments and suggest mitigation, such as the recent inclusion of a light rail system in a new residential area for 7000 people. Finally, he suggested that equity issues must be addressed in considering market incentives. For example, low-income groups can be negatively affected by a measure such as ride sharing. Regulatory bodies have not been good at representing the poor.

2.4 Current Initiatives

Please note that the speakers and the order of presentations were significantly changed from what is shown on the agenda.

2.4.1 Harry Vogt: CCME Efforts

The Canadian Council of Ministers of the Environment (CCME) has established a Task Force on Atmospheric Issues, whose mandate is "to develop a comprehensive atmospheric management strategy for Canada". Its activities cover:

- developing strategies for greenhouse gases;
- coordinating implementation of CCME approved strategies [Nitrogen Oxides (NO_x)]/(Volatile Organic Compound) (VOC, SO_2);
- monitoring results; and
- coordinating stakeholder consultation.

Specific initiatives include:

1. Bilateral agreements: umbrella air agreements, NO_x/VOC agreement, SO_2 amending agreement;

2. Emissions trading: NO_x/VOC in the Lower Fraser Valley, SO_2 in eastern and western Canada;

3. Implementation of NO_x/VOC Action Plan: codes of practice, stakeholder consultation, tracking system;

4. Greenhouse gases: inventories, clean air strategies, inter-ministerial consultation;

CCME is also responsible for helping Canada fulfill its responsibilities under the following international agreements:

1. UN framework convention on climate change:

    - Canada's initial position is to establish greenhouse gases at 1990 levels by the year 2000.
    - A federal-provincial committee is advising the federal government in developing its position.
    - An advisory committee made up of industry and non-government organizations is also assisting.

- The western provinces have established an air quality coordinating committee which includes energy and environment ministries.

2. Economic Commission for Europe (ECE) NO_x Protocol:

   - The protocol aims to stabilize NOx emissions at 1987 levels by 1994.
   - This is considered consistent with the CCME NO_x/VOC plan.

3. ECE VOC Protocol:

   - This is still under discussion.
   - Canada's position is a goal of 30% reduction in VOC only in non-attainment areas.
   - This is potentially consistent with the NO_x/VOC plan.

4. U.S./Canada Air Quality Agreement:

   - This accord confirms the SO_2 cap for the eastern provinces of 2.3 m tonnes by 1994.
   - It sets a national target of 3.2 m tonnes by 2000.
   - It also established BACT (Best Available Control Technology) emission standards for a range of gases.

5. Protocol on Substances that Deplete the Atmosphere (Oct. 1987) (Amended 1990):

   - All CFC's and Halons will be phased out.
   - Some countries have earlier target.

The British Columbia position on key emissions can be summarized as follows:

1. *Greenhouse Gases:* An inter-ministry policy committee has been established. B.C. completed an inventory of CO_2 sources and sinks, and will develop inventory and management strategies for all major greenhouse gases by late summer 1991.

2. *NO_x/VOC*: B.C. has established a vehicle inspection and maintenance program and is developing ways to address summer gasoline volatility, control of VOC from the gasoline marketing sector, alternative fuels, and updating of emission standards.

3. *CFC's* B.C. is drafting regulations to encourage recycling of CFC's and will establish controls on CFC emissions.

4. SO_2 B.C. is addressing the issues of updating emission standards, the natural gas pipeline, regulation of sulphur in fuel, and critical loading analysis.

Finally, Mr. Vogt suggested that CCME's major challenges are: (1) ensuring provincial input to negotiating international agreements; (2) finding resources to implement strategies to meet international and national commitments; and (3) building partnerships, including federal-provincial, provincial-local government, provincial-neighbouring U.S. states, and intersectoral, including business and the public.

2.4.2 Derek Henriques, BC Hydro Power Smart and Fleet Vehicles

Mr. Henriques opened by describing the BC Hydro Fleet Emission Reductions Program, which has the following objectives in its five-year plan:

- major reductions in fleet emissions within 18 months: 70% over five years;
- accelerate annual new light duty (LD) vehicle purchases from 75 to 90;
- implement new engine replacement program for Medium Duty (MD) and HD trucks, 16 units per year; and
- retrofit LD vehicles with natural gas, up to 50 per year.

The Fleet Program aims to introduce a stringent emission-control inspection and maintenance program for the fleet. BC Hydro will also stay abreast of emerging fuel technologies through analysis, testing and supporting evolving EV technologies through the purchase of demo electric vehicles.

BC Hydro's Power Smart Program is aimed at the users of hydro. Its mission is "to reduce the rate of consumption of electricity in B.C. in a manner that is cost-effective, sustainable and serves our customers' needs and their concerns for the environment."

The program has been highly successful, having saved enough electricity in two years to provide for 25,000 homes, representing one year's residential load growth. The twenty year goal is to conserve enough energy to supply 579,000 new households.

The program aims to promote activities that will establish a new electric energy efficiency ethic in three ways: changing current usage, influencing new purchases and providing leadership in the development of future electricity usages. This ethic encompasses two principles: energy is considered in all business and personal decisions, and electricity is considered at its value and not its price.

BC Hydro has adopted the following five strategies to promote social change:

1. *Technological*: includes product modification, substitution and innovation (e.g. home weatherizing, light bulb exchange, efficient appliances).

2. *Economic*: using cost imposition and rewards (e.g. incentives such as equipment rebates, pricing based on future marginal costs of producing electricity). (Note: Canadians use electricity at twice the per capita rate of other industrialized countries, due largely to its traditional low cost.)

3. *Political/Legal*: legislation and regulation (e.g. building codes and motor usage regulations).

4. *Educational*: information, support and involvement by BC Hydro (e.g. providing structure for school programs).

To achieve the Power Smart goals, BC Hydro's social marketing strategy includes four steps:

1. *Change attitudes*: through promotion and education about the benefits of conservation.

2. *Eliminate barriers*: through information, incentives and availability of products.

3. *Change behavior directly*: through rates, tariffs, codes, standards and legislation/regulation. Mr. Henriques noted that there are no energy efficiency requirements in the B.C. Building Code or in appliance standards (latter will be introduced soon).

4. *Reinforce new behavior*: promotion, education, rewards.

BC Hydro has also introduced in-house energy efficiency for buildings and programs to encourage employees to use public transit.

Questions and Comments:

Lenore Herb of SPEC asked how BC Hydro will guarantee that its program will lead to concrete rewards such as increased habitat preservation and increased quality of life. Mr. Henriques responded that, with increased energy efficiency, B.C. will be able to absorb population and economic growth without increasing power generation at the same rate.

Murray Ward of AWMA asked whether BC Hydro policies and other initiatives are assessed for possible negative environmental impacts. Mr. Henriques noted that Power Smart includes energy efficiency, fuel switching from hydro to gas for water and space heating and cogeneration activities. He said that studies indicate that cogeneration has net positive effects, but that the other initiatives have not been analyzed. Mr. Ward drew attention to the need to assess possible concerns with hog fuel and coal cogeneration.

Dr. Douw Steyn of UBC applauded BC Hydro's programs, but expressed concern regarding their promotion of energy efficient refrigerators which may use blown foam containing CFC's. All agreed this was unacceptable and it will be looked into.

Jackie Hamilton of the Ministry of Development, Trade and Tourism asked who is on the CCME Emissions Trading Task Force. Steve Martin of the Environment Protection Division, B.C. Environment, and Barrie Mills of GVRD are participating. Ms. Hamilton also asked about B.C.'s high per capita rates of energy use. "If we as Canadians use electricity at twice the rate of other industrialized countries, will the [Power Smart] program target 50% reductions?" Mr. Henriques said that our high consumption is partly due to our large homes and dispersed cities, but we also have more appliances and gadgets. BC Hydro has a buy-back program for old energy-consumptive fridges and will dismantle them at a special facility.

Peter Cave, Fraser-Cheam Regional District, asked how B.C.'s vehicle emissions standards for cars, buses and trucks will compare with California's. Mr. Vogt responded that B.C. Environment will set standards for LD (light duty) vehicles based on the manufacturer's recommendations for each car model. They will be set to target a 70% pass rate (e.g. the 30% of cars that fail will require maintenance work). This rate will continue each year so that standards get progressively tighter. Lorrie Adam of B.C. Environment added that LD vehicle emissions have been limited since 1988 to levels representing about 5% of what vehicles used to emit; by 1994, standards will be as stringent as California's. HD and diesel vehicle standards are also being tightened to California levels by 1994 and 1996.

2.4.3 Martin Kobayakawa, BC Transit, Go Green

Mr. Kobayakawa opened by describing the Vancouver Region as having an urban core and several regional centres. Population growth has been dramatic since the mid-1980's, averaging 2% per annum (this is a 35 year doubling time) and is projected to reach 2.5 million by 2011. Employment continues to be highly concentrated in Vancouver and, to some degree, in Burnaby and Richmond, resulting in increasing commuter traffic from bedroom communities and growing congestion. Decentralization is leading to low density suburbs which are difficult to service by transit. BC Transit covers the

largest service area in Canada, its 1500 sq. km. region is twice the size of Toronto's.

It is evident that transit is environmentally friendly. 75% of air pollution in Greater Vancouver is from vehicles. In comparing emissions from autos and buses on a per passenger basis, a bus rider produces only 2% of hydrocarbons, 25% of NO_x and 5% of CO_2 that the car rider produces. Transit is also energy efficient and provides significant savings to the environment; for this region, it saves 116 million litres of gas, 20,000 tonnes CO (carbon monoxide), and 259,000 tonnes CO_2 per year. BC Transit is trying to promote a modal shift to transit based on these environmental benefits.

Strategies to promote transit use include:

1. "Carrot and stick" methods

BC Transit is expanding its role beyond the traditional focus on public transit. The two major goals are: (1) to raise public awareness that vehicles, not industries, contribute most to regional pollution; and (2) to get people to replace all or part of SOV (single occupancy vehicle) trips with MOV (multiple occupancy vehicle) trips.

"Carrot" measures in place or being explored include:

- incentives for transit use,
- car and van pooling, ride share programs,
- transit priority measures (e.g. HOV lanes, bus-only lanes),
- cycling options (e.g. bike 'n ride), and
- improved transit service, including rapid transit.

An example is Go Green's employer program which uses employers as transit advocates in the workplace by providing them with information on public transit as an employee benefit, user kits to promote transit, and joint venture partnerships.

Disincentives to SOV trips include:

- high cost of SOV use,
- legislative methods to discourage SOV use,
- increasing congestion, driving time, which implies minimal highway improvements, and
- high downtown parking rates.

2. Community and Regional Planning

This involves the integration of public transit considerations into land use planning and urban design. Examples include:

- subdivision design policies to favour transit (e.g. street layouts and walkways providing direct access to bus stops),
- concentrated nodal employment and commercial development (e.g. Metrotown, Westminster Quay, Lonsdale Quay, which also function as transit exchanges),
- high density residential areas, which are easier to service and support greater ridership, and
- incorporation of transit into downtown urban design (e.g. Burrard Skytrain station).

3. Improved Transit Service

This includes improved service levels (i.e. frequency), express services, HOV lanes, bus lanes, other transit priority measures, community buses and feeder services. Rapid transit has proved very successful, especially for the white collar, downtown employees, and there are plans for expansion.

4. New Technologies

BC Transit is also looking into using fuel cells, natural gas and more electric vehicles.

2.4.4 Gerry Ertel, Canadian Petroleum Products Institute, PACE

The Canadian Petroleum Products Institute (CPPI), founded in 1989, is a national organization of Canadian companies which refine and market petroleum products. Its focus is "to deal with common environmental, health, safety and business issues".

A key activity at the national level is the *National Health Risk Assessment*, which uses research on the use of quantitative cancer risk assessment in setting regulatory standards. Currently, estimates of benzene potency are based on a linear model. The research examines ambient benzene exposure as a case study. The objective is to develop a plausible biological model to accurately reflect risk, and as a basis for establishing benzene ambient air guidelines.

In a study completed in March 1991, Drs. Ricci and Cox made the following observations:

- the multi-layer conservatism built into risk estimation models is questionable,
- the process of extrapolating effects from exposure data several orders of magnitude above current levels is also questionable,
- research supports a non-linear dose response function,

- this evidence serves as foundation for alternate models of risk estimation for benzene and other toxics, and
- a 50 ppb benzene ambient air guideline is recommended.

CPPI is also attempting to identify control technologies to achieve the lowest achievable emission rate (LAER), using benzene as a case study. It is sponsoring a consultant (ENSR) report, to be completed in 1991, which provides a guideline on determining LAER. Benzene emissions from refineries and the gasoline distribution network are being reviewed.

Another CPPI initiative in B.C. involves *Stage 1 vapour recovery* from gasoline marketing operations. Stage 1 includes gasoline transfers and storage while Stage 2 is refueling. Vapour recovery control systems are designed to recover and recycle the vapours so that they are not emitted to the air.

Vapour recovery is important because VOC and NO_x, found in gasoline vapours, are precursors to ozone, which contributes to smog and is a health and environmental concern. Maximum acceptable ozone ambient air standards are routinely exceeded in the summer months in the Lower Fraser Valley (LFV).

Studies were initiated in 1984 to establish current emission data for the LFV and to inventory VOC emissions from the gasoline marketing network. Gasoline distribution accounts for 6% of VOC emissions in Canada, with 55% of that total occurring during Stage 1. Refineries account for 51.5% of total emissions, with the rest from service stations (33.9%), terminals (9.2%) and bulk plants (5.5%). Total VOC emissions in B.C. were 289 kilotonnes (kt) in 1985, with 114.1 kt in the LFV. Stage 1 improvements should see VOC emissions reduced from 3.2 kt to .5 kt.

The Canadian Council of Ministers of Environment (CCME) directed in 1988 that a National NO_x/VOC Management Plan be developed, and challenged the petroleum industry to improve its VOC emissions before legislation is passed. CCPI implemented a test program for Stage 1 controls in the LFV to serve as an example for other regions, especially the Windsor-Quebec corridor. Control was recognized as effective, with net benefits of $190 - 310 per tonne of VOC removed. Controls worth $15 million are being installed at gas terminals, bulk plants and service stations in the LFV and will be operational in summer 1991. CPPI will work with Environment Canada to evaluate their effectiveness, using baseline data they have gathered.

Another CPPI initiative is *gasoline vapour pressure (RVP) reduction* which also helps to control VOC emissions. Gasoline volatility is related to the light hydrocarbons, primarily butane. Volatility affects a vehicle's emissions at three points: expansion and contraction of the gas tank (diurnal emissions), hot soak (gas can vapourize after car shuts down) and running losses. Volatility is also a factor in emissions from gasoline distribution.

CCME established a joint industry-government study of the impact of RVP phasedown. The NO_x/VOC Management Plan recommends reduction from 79 kpa to 62 kpa in non-attainment areas. The industry voluntarily agreed to reduce RVP from 79 to 72 kpa across Canada in 1990. Compliance was excellent and costs and impacts of the program are being assessed. CPPI is working with B.C. Environment on a regulatory initiative for achieving the next phase of RVP reduction to 62 kpa. Total emission reduction is 6.2 kt at a cost of $2200/tonne ($13.5 million).

The final initiative discussed was a four-phase *environmental assessment of the petroleum industry in the GVRD*. Its goal is to assess waste discharges from the four petroleum refineries, storage facilities and truck rail and marine terminals in the Lower Mainland. Data will be gathered by a joint task force which will:

- characterize the quantity and quality of waste discharges,
- review compliance with existing regulations,
- assess existing and future impacts, and
- evaluate options, costs and benefits.

Other issues which the CPPI will address in future are the NO_x/VOC Management Plan (including a NO_x process emission study and a code of practice for fugitive emissions from refineries); hazardous air pollutants as part of the CEPA Priority Substance Review; and global warming. CPPI has carried out over 70 studies since 1977 and looks forward to continuing to participate in resolving environmental issues.

2.4.5 Hugh Kellas, GVRD, Creating our Future: Air Quality and Regional Development

Mr. Kellas noted that the kind of city we build has a lot to do with the kind of air we breathe. Cities don't just happen; they result from thousands of decisions which can be more or less purposeful. "You either get what happens or you get what you want." We call Vancouver "Spectacular by Nature", but what are we willing to do to keep it that way? The issue lies in how we choose to affect the way in which Greater Vancouver develops and whether we have the institutional mechanisms to achieve our goals.

Greater Vancouver is a metropolitan area of 1.5 million with another 240,000 in the Fraser Valley. Development is constrained by physical barriers (mountains, sea) and policy (ALR, floodplain). The population is growing at 35,000-45,000 per year, which represents an annual growth rate of about 3%, primarily from in-migration. The population is forecast to grow from 1.75 million in 1991 to 2.5 million in 2011 with about 75% of that in the GVRD and the rest in the Valley. This will lead to increased distances between where

people live and where they work and lead to growth in auto commuting. There are nearly a million registered vehicles in Greater Vancouver; 350,000 of those are registered for the journey to work (JTW). The JTW figure has risen by almost 40% or 100,000 in the past 5 years.

Dealing with air quality in the region is difficult as we must address topography, multiple local jurisdictions, two countries and numerous regulatory agencies. The mountains tend to trap air under inversions and limit pollutant dispersion.

Public concern regarding air quality is strong; a survey of attitudes showed that, out of 54 concerns, industrial air quality ranked 2nd and auto pollution ranked 8th. This hasn't changed since comparable 1973 surveys. The recent survey also showed that 80% would pay taxes to clean up air pollution; however, by almost 2 to 1, respondents disagreed with the statement that "pollution from automobiles should be reduced by increased fees, tolls or taxes".

Regional development policy can help to address air quality issues. Air quality was one reason for the adoption in the GVRD's "Liveable Region Strategy" of policies favouring a jobs-to-labour-force balance, a transit-oriented transportation system and regional town centres. Part of the strategy has been put into place. Transit ridership has risen about 120,000 per year and regional town centres are being developed, but the jobs-to-labour-force balance is only holding its own. While transit use is rising, so is total travel.

The "Creating our Future" process in 1990 was intended to revitalize the "Liveable Region Strategy". Public discussion was used to consider a broad range of regional goals and actions. The GRVD Board adopted 54 actions ranging from a liquid waste management plan to establishing an environmental quality index.

The public's objectives are clear - they want clean air. But some constraints are also clear - they value and will not easily give up the convenience of their cars. We have to create a city form which makes connections between land use and transportation. We must provide incentives that encourage more people to use other forms of transportation and, for those who use cars, to use them less. To do this, the institutional mechanisms for managing air quality must be closely connected with those for managing land use. The local-regional approach of regional districts has the potential to offer the best approach. It endeavours to integrate both top-down and bottom-up goals and initiatives. But we need an authority that more closely reflects the airshed, and we need strategic regional planning powers that ensure that land use and transportation goals essential for air quality are achieved. A clean air strategy is a key initiative in ensuring that Vancouver continues to be "Spectacular by Nature".

Questions and Comments:

Peter Cave from Fraser Cheam Regional District asked if CPPI supports the federal Environmental Code of Practice for underground storage. Mr. Ertel affirmed that CPPI was involved in preparing the standards. The questioner noted that his agency has trouble getting some members of CPPI to respect these standards and suggested that CPPI could help by "giving them a push". Mr. Ertel noted that most companies have schedules in place to meet the standards.

A delegate from BC Building Corporation asked when CPPI will be addressing Stage II vapour recovery. Mr. Ertel noted that controls can be applied in cannisters and nozzles and that they are starting by looking at the most efficient recovery methods.

Michael Jordan of Canfor asked what percentage of person-miles are by transit and what are BC Transit's goals in this regard? Mr. Kobayakama answered that currently 40% of peak hour downtown movements are by transit and a goal of 60% by 2006 has been set in cooperation with the City of Vancouver. A second question related to provisions for bicycle use downtown. Mr. Kellas responded that the GVRD is gathering ideas from the municipalities to share with others, but it is still not high on the list of priorities of transportation engineers. He also noted that much of the increasing travel demand is suburb to suburb, which is difficult to service by transit unless concentrated in nodes.

Dave Spittlehouse of the B.C. Forest Service asked about Interior issues, such as smoke management, point sources. Mr. Vogt noted that these sources are relevant due to their contribution to both global and local problems.

Dermott Foley of SPEC asked about the purpose of lowering the benzene standard, which is intended to protect public health, from the U.S. standard of 37 pptrillion. Mr. Ertel noted that CPPI wants to propose an alternate model for assessing the real risk. He noted that ambient levels in urban areas are currently about 1-10 parts per billion (ppb); thus, health impacts may not be reflected in current U.S. standards. One of the most important sources of benzene in the urban environment is the car.

Anne Hillyer of WCELA noted the imminent introduction of the B.C. Energy Efficiency Act and new appliance standards. She went on to ask about the House of Commons Standing Committee on Global Climate Change recommendations that fuel efficiency standards for cars and light trucks be established to reduce vehicle emissions. "Will CCME be acting on these recommendations?" Mr. Vogt replied that the CCME NO_x/VOC management plan will be addressing the setting of new standards for vehicle emissions and provincial government are looking at reductions for all vehicles. Ms. Hillyer wondered if B.C. will use legislation to improve the vehicle efficiency and not

just reduce emissions. Mr. Vogt noted that there are 54 measures in the plan, so concepts like that will be investigated. Ed Wituschek of Environment Canada said this idea is called "corporate average fleet economy" (CAFE) in the U.S. and is currently 27 miles per gallon.

Ken Bennett of the District of Surrey emphasized that individuals, and not just government and industry must take action. He noted that Surrey's transit service is very bad. Mr. Kobayakama responded that Surrey is very dispersed and difficult to service with transit. However, recent efforts to concentrate development in town centres should improve the situation.

Elmer Berlie suggested that there should be more parking at Skytrain stations, especially given the high cost of parking downtown. Mr. Kobayakama noted that the policy in the first phase of Skytrain was to integrate buses with Skytrain and provide minimal parking within dense urban areas (Vancouver, Burnaby). So far, they have emphasized Park'n Ride only for suburban stations, but a forthcoming regional Park'n Ride policy should address this issue.

Anne Rudebach of the Chilliwack Environmental Advisory Panel noted that the discussion had focussed on Vancouver and the Lower Fraser Valley, but it is the Upper Fraser which experiences the air. She suggested that regional districts should view the valley as an airshed and be united in their quest for clean air. Citizens of the Upper Valley should have an influence on environmental strategies in Vancouver.

3.0 Summary of Issues from Workshops

On Day 2 of the conference, participants were divided into twelve small workshops of 6-12 people, each of which addressed one of these topics:

- (3.3) standards and regulations,
- (3.4) economic issues,
- (3.5) energy,
- (3.6) transportation,
- (3.7) forest products,
- (3.8) other industrial sources and non-industrial sources.

The full workshop reports are provided in Appendix A and should be consulted for details on the views and consensus recommendations of each group. Although the workshops were organized around specific topics, most groups made recommendations on diverse aspects of air management.

The following section provides a summary of general themes and key issues that were raised in both workshops and plenary discussions. For each issue, there is an issue statement, a brief description of the problem and one or more recommendations from participants.

Please note: Since a great diversity of views was represented at the conference, the following points were not necessarily agreed to by all participants. In instances where there seemed to be general agreement among most participants, this is noted. The summary of issues are as follows.

3.1 Issues

Many participants raised general points regarding the preparation of the Clean Air Strategy and the conference itself.

Issue: Defining the goals and process for the "Clean Air Strategy".

Several participants noted that there has been no clear statement of the goals and process for arriving at a Clean Air Strategy. "Why is this an issue and what are the concrete outputs expected, including mechanisms and the results of our work?"

Recommendations:

1. Announce the strategy process, with clear targets which define objectives, products and an attainable timetable.

2. Pay special attention to making the connection between global issues and provincial and local actions.
3. Allow for differing regional needs and priorities within B.C.
4. Review strategy initiatives in other provinces, looking for good ideas.

Issue: Participation by all stakeholders in strategy development and implementation.

Participants agreed that all parties, including industry, government and public must be prepared to take action to reduce air pollution. Thus, they felt the Province should show a commitment to include multi-stakeholder and multi-agency input in developing the strategy. Most felt that the time for discussion at the conference was too short and they would welcome further opportunities for consultation. Several participants felt that the conference represented only a limited cross-section of society and that efforts should be made to include broader representation, for example, from labour.

Recommendations:

1. B.C. Environment should define the full range of affected stakeholders from the community, industry and non-government organizations and design a process to allow them to make effective balanced input.
2. All agencies which have a role in air management should participate in developing the strategy. The Ministries of Forests and Energy, Mines and Petroleum Resources were mentioned as particularly important.
3. Some participants suggested that a long-range energy assessment should be included in strategy development.

Issue: Public education as part of the Clean Air Strategy

Participants noted that public education is needed because we are often ill-informed about air issues. For example, it was suggested that many people do not realize the key role of cars in causing air pollution. Involvement of the public will also help to ensure public support for clean air policies which may be costly or require lifestyle changes.

Recommendations:

1. Public education and the provision of good, current relevant information should be included as part of the strategy process. Some participants supported the preparation of a "public education kit" to

provide communities with information on current problems and the need for lifestyle changes.

2. Stakeholders need background information on various approaches to issues (e.g. standards, control/prevention).
3. It was suggested that Strategy organizers analyze the results of the Provincial Round Table consultations to see if air issues were raised.
4. There was virtual consensus that a great deal of on-going public education on air issues is needed. It was suggested that the universities could play a greater role in community education.

Issue: Clean Air Strategy implementation: the need for urgent action.

A high level of concern and frustration was frequently expressed about government inaction (especially the provincial government), the gap between public concern and government commitment, and the often slow political response to identified problems. There is also concern as to whether there exists the political will to follow up on this conference and the eventual recommendations of the Strategy. Several participants expressed disappointment that there were few representatives at the conference from the political level and senior ranks of government and industry.

Recommendations:

1. The strategy should include clear targets and deadlines which reflect the urgency of air issues. (e.g. One of the Transportation workshops suggested a goal of a 50% reduction in air emissions by the year 2000.)
2. The proceedings of the conference should be distributed widely, especially to municipalities of the GVRD and in Whatcom County to build support for the strategy.

Issue: Socio-economic and political impacts of the strategy.

Some concern was expressed that the Clean Air Strategy could have adverse socio-economic and political impacts.

Recommendations:

1. Incorporate into the strategy information on net socio-economic impacts (cost-benefit) of "clean air" in B.C. and address how we can adapt to or mitigate negative economic and social impacts from major changes.

3.2 Jurisdictional and Decision-making Issues

Issue: Lack of clarity regarding areas of responsibility for air quality among government agencies.

Significant concern was expressed in most workshops regarding the problem of identifying the jurisdictions and roles of various environmental agencies and levels of government in addressing air issues. Participants noted the following problems: conflicting policies among municipal, provincial and federal agencies; inconsistencies in geographical and political boundaries which make rational air management difficult; problems at the local level when the federal government signs international agreements.

Recommendations:

1. Define a process to involve government, industry and the community in achieving cost effective air quality management. Ensure clarification of jurisdictional issues, adequate resources and political will.
2. Establish "an objective decision-making body for air management issues, composed of industry, government and public interest groups". (See "airshed management" below.)

Issue: Need for airshed management approach

There was strong support among diverse participants for an airshed management approach. This involves the preparation of regional airshed management plans and the possible formation of regional airshed authorities, as appropriate. A specific airshed authority was seen as particularly important for the Fraser Valley, due to the seriousness of pollution problems, especially in the upper valley. Specific suggestions were numerous.

Recommendations:

1. An air management authority should be established for the Fraser Valley. Various models were proposed, with the Southern California Air Quality Management District often cited as an example, due to its ability to oversee regional development as well as transportation and air quality.
2. Various options were suggested for the structure and composition of the new authority, agency or board:
   - made up of various stakeholders and independent of government,

- based on regional districts and their representatives,
- consisting of representatives from relevant government agencies,
- some combination of government agencies and stakeholders.

3. There is some support for changing the current legislation to allow for a Fraser Valley Authority, to include the Upper/Lower Fraser Valley Regional Districts with the GVRD.
4. Some participants felt that the authority should cover the GVRD, some the LFV and the entire valley. In any case, most recognized that Upper Valley residents should have greater influence over air quality decisions taken in the GVRD.
5. The authority could have various responsibilities, including development of regional air quality goals and objectives; a legislative mandate for planning and/or permitting; coordination and dissemination of studies; and/or public information and education.
6. Similar groups could be developed for other priority airsheds.
7. The public should have input on the structure and operation of the airshed authorities
8. A defined timetable should be established for regional air management authorities, preferably within one year. ("Municipalities are ready now, but what will the Province agree to?" said one participant.)

Issue: Role of regional planning in air management (Lower Mainland)

Participants repeatedly raised the issue of using regional planning to deal with air issues in the Lower Mainland. There was concern that the GVRD currently does not have regional planning powers, but can only advise. The need for regional planning was often linked with discussion about the proposed Fraser Valley airshed management authority (described above).

Recommendations:

1. Many participants felt the GVRD planning powers should be restored or that some regional planning body with greater authority over municipalities is necessary.
2. The goal of such an authority would be the integration of population growth, land use planning, development, energy and transportation throughout the region.
3. Some thought that regional planning should be subject to environmental assessment or should fully integrate environmental factors into development planning.
4. Some participants felt that the authority to review land use and development decisions should lie with the airshed agency while others would integrate it in some fashion with the GVRD.

Issue: Promotion of cooperative decision-making approaches

General comment

Many participants noted the importance of involving all stakeholders, not just in the Clean Air Strategy, but in all decision-making on air quality. Cooperative consultations such as the conference are seen as useful for understanding and solving air quality problems. Some industry representatives noted that "while industry has sometimes been part of the problem, it has been and will continue to be part of the solution if given the opportunity to participate in the process". Representatives of public interest and community groups also expressed strong interest in continued involvement in air management.

Issue: The need for research and development to support decision-making

Participants noted that there is a lack of knowledge and much uncertainty associated with many air issues. Many problems are not clearly defined and must be further evaluated before effective and cost-effective actions can be taken.

Recommendations:

1. Technological innovation should be encouraged in order to provide other tools besides regulations, such as process improvements and raw materials substitutions.
2. We must find solutions which do not create new problems; thus, research is needed to help us understand the environmental impacts of various technologies.
3. More interdisciplinary research is needed in order to deal with complex problems.
4. R & D in general should not just focus on single problems, but should address issues in an integrated fashion. One example is the need to control greenhouse gases in a holistic way, so that other environmental problems aren't made worse.

3.3 Standards and Regulation Issues

In general, many participants (especially those in the Standards and Regulations workshops) agree that a B.C. Clean Air Strategy is needed. It was suggested that B.C. lacks a systematic and effective air management strategy, with a clear process for defining and implementing air quality regulations,

standards and permits. The largest number of comments and suggestions at the conference referred to the design, implementation and revisions of laws, regulations, objectives, standards and policies. Every workshop provided comments on these topics.

Issue: Outdated laws, regulations and objectives

Many participants suggested that existing pollution control objectives and criteria are outdated and that updating is being done only on an *ad hoc* basis (e.g. industrial sources). Some feel that B.C. Environment lacks an overall mission for standards and regulations: "we do not have a focus of where we want to go". However, it is also recognized that it is difficult to identify realistic and appropriate standards. Numerous suggestions were made.

Recommendations:

1. Establish specific reduction targets for ambient and source air contaminants, by airshed. This should be a phased-in approach, focussing on prevention of discharges working towards "zero" emissions. (There was some disagreement on setting ambient standards due to problems in identifying appropriate ambient levels and deciding to what degree technology should dictate emission levels.)
2. Upgrade provincial pollution control objectives with input from stakeholders and make them legally enforceable.
3. Produce regulations that are clear, enforceable, comprehensive (i.e. cover all industries), and consistent across the province.
4. Use Best Available Control Technology (BACT) in addition to ambient air quality standards, considering technology and health.
5. More work is needed on the relationship between BACT and ambient air quality: Should technology dictate the standards? Are ambient levels appropriate?
6. There should be periodic review and up-dating of objectives and regulations in view of new environmental requirements and technologies.
7. Where appropriate, industry should have the freedom to choose various processes to achieve stated aims.
8. B.C. should adopt federal guidelines as policy.
9. Look at other jurisdictions (e.g. other provinces) for information and ideas on standards and regulations.
10. Better ambient air measurement technology is needed.
11. Permit charges should be allocated to pollution abatement. Individuals and industry could be required to pay for use of air resources to generate needed funds.

12. Control strategies must be applied to all sources of PAH's (Polyaromatic hydrocarbons), which are an emerging concern not confined to industry (e.g. wood stoves).

Issue: Over-emphasis on pollution control and not enough attention to pollution prevention.

There was a great deal of discussion throughout the conference on the relative importance of control vs. prevention approaches. Many participants feel that both technological development and government regulations have focused too much on pollution control (e.g. end of the pipe instead of controls on inputs into production).

Recommendations:

1. Most participants agreed that prevention measures should be increasingly emphasized. For example, one group proposed that more attention should be paid to Best Available Prevention Technology (BAPT) rather than BACT.
2. There was consensus that a diverse array of approaches should be used, including both "carrots" (i.e. incentives) and "sticks" (i.e. laws/regulations). A wide variety of measures were mentioned, including airshed management techniques, economic incentives, emissions trading and new technology.
3. There was significant interest in market incentives, although it is recognized that more research is needed as to their effectiveness and appropriateness (see "Economic Issues").
4. The traditional "command and control" mode should be complemented with cooperation and partnerships among all stakeholders.

Issue: Lack of enforcement of current laws

Many participants were concerned about the enforcement of existing legislation and government willingness to act on problems. They identified problems in monitoring, enforcing and prosecuting polluters. It was suggested that B.C. Environment does not have enough regulatory power to bring legal weight to enforce permits and regulations.

Recommendation:

While positive incentives for clean air are seen as desirable, participants noted that we still need to monitor emissions more closely and then enforce

legislation and regulations when there are problems. Enforcement powers should be strengthened where they are weak.

Issue: On-going consultation and involvement by stakeholders in developing standards and regulations.

Many participants feel that the various stakeholders in air quality have not been adequately consulted in the development and revision of laws, regulations, objectives and standards. Problems sometimes arise when there are not enough technically competent and experienced people involved in setting regulations.

Recommendations:

1. New laws, regulations and policies should be developed with full multi-stakeholder consultation. This will allow the agencies to draw on the expertise available within industry, public interest groups and the community. It will also permit the public to provide input on acceptable standards.
2. Stakeholders should be provided with background information explaining the basis for proposed regulations in order to maximize their cooperation in implementation.
3. Consultation and advance warning on future regulations and standards will allow industry and municipalities to plan properly.
4. Regulatory agencies should provide opportunities for on-going contact with the public (e.g. complaint line) on specific issues.

Issue: Failure of regulations to address the mix of various pollutants

There is concern regarding the fact that current objectives and ambient air standards are set only for individual pollutants.

Recommendation:

Objectives and ambient standards should recognize pollutant mix (synergistic effects).

Issue: Toxic air contaminants.

The lack of an adequate inventory of toxic pollutants and scientific proof on toxic effects makes it difficult to develop standards and regulations.

Recommendations:

1. Develop an adequate list and inventory of toxic emissions, assess health risks and implement specific control programs.
2. Set a goal of the virtual elimination of toxic air pollutants.

Issue: Inconsistency in standards

It was noted that "grandfather" clauses can lead to different standards among industries and sectors.

Recommendation: Some participants, including representatives from industry, feel that "grandfathering" should be discouraged as it is a disincentive to long-term strategic planning by industry. They suggested that industry should anticipate tougher regulations and technology changes into the next 15 years or more when designing plants.

Issue: Unregulated air emissions sources

There is concern regarding uncontrolled sources of emissions (e.g. small exhaust vents from paint shops and welding garages). Often, there are controls on the same types of sources for major industries, a situation resulting in inconsistent controls and no control on small emitters in cities.

Recommendation:

Develop some consistency in controls and start to target unregulated sources.

Issue: Lack of staff resources within B.C. Environment to deal with pressing air management issues.

Recommendation:

More resources should be provided, especially to develop air quality standards and emissions controls and to monitor and enforce permits.

Issue: Weakness of legal system in addressing air issues

Recommendation:

Some participants feel that there should be more emphasis on using the courts; for example, permitting citizens to sue for public nuisance and to compel enforcement of laws.

Issue: Competitiveness as a factor in choosing air management strategies

Recommendation:

Industry representatives are generally concerned that the process of setting air emissions regulations should address the need to maintain a "level playing field" with other provinces and countries. This may mean that we should help to promote and disseminate B.C. solutions in other countries.

3.4 Economic Issues and Instrument Issues

It was recognized by most participants that addressing air pollution problems may have significant economic consequences but that failure to do so would have serious, often unmeasurable costs.

Issue: Need for environment-economy integration in decision-making which affects air quality

Recommendations:

1. Environmental costs, including impacts on air quality, should be considered when assessing the acceptability of new projects (i.e. internalize environmental costs). B.C.'s provisions for environmental impact assessment of major projects could be amended to better include these considerations.
2. Environmental accounting is seen as useful for assessing development options. Other specific measures were mentioned; for example, linking business licensing to environmental acceptability of a business.

Issue: How will economic factors and analyses be used in decision-making on air issues

Economic instruments are increasingly recognized as key tools in achieving environmental goals. Yet participants noted the difficulty in incorporating economic tools, given the narrowness of some traditional economic analyses, the existence of non-quantifiable benefits, and costs and gaps in scientific knowledge which could weaken the analysis.

Recommendation:

Develop a systematic approach to developing types of economic analysis which will be beneficial for decision-makers, be independently administered, acknowledge and address the pitfalls above, and incorporate stakeholders' views.

Issue: Insufficient information on the full range of economic instruments available for B.C. air quality control.

Recommendation:

Create a working group, including public representatives, to research economic instruments, their use elsewhere, their effects, appropriate applications, and fairness and equity issues.

3.5 Energy Issues

The crucial importance of energy choices for air quality was acknowledged throughout the conference, due to the overwhelming importance of hydrocarbon burning in causing air quality problems locally, regionally and globally. Most workshops ended up addressing some aspects of energy and the closely related topic of transportation.

Issue: Lack of an integrated approach to energy planning

It was suggested in one Energy Workshop that B.C. needs a systematic approach to energy planning which incorporates environmental goals and factors, including maintainance of air quality. A variety of recommendations were made which could be considered as part of such a strategy.

Recommendations:

1. Evaluate B.C.'s long-term needs, energy sources, alternatives and sustainability of supplies.
2. Establish a mechanism to coordinate all aspects of environmental impact assessments, including land use policies, energy policies, transportation and communications.
3. Promote R & D into energy efficiency, conservation and soft (alternative) energy and non-polluting technologies.
4. Conservation and efficiency measures, fuel substitution and fuel choices should be reviewed for their positive contributions to reduced industrial emissions.
5. Provide incentives for energy efficient or conserving actions and selection of renewable (soft) energy sources.
6. Require minimum levels of energy efficiency and conservation in regulations (e.g. Building Code).

Issue: The need to develop an economic strategy which is integrated with environmental and energy strategies.

Recommendation:

Establish an integrated economic strategy, which considers especially the concept of "polluter pays" and the need for international regulations, long-term perspectives and cradle-to-grave environmental accounting. Both environmental and economic benefits of energy conservation and efficiency should be considered.

Issue: Defining a realistic share for B.C.'s (and Canada's) responsibility to limit the production of greenhouse gases

Recommendations:

1. Negotiate with the federal government to define the evaluation methodology for determining our share of responsibility.
2. B.C. should carefully research and establish its position on national emission caps and proactively communicate this through mechanisms such as CCME.
3. Find opportunities for transferring B.C. strategies to developing countries to help them minimize their emissions, while developing B.C. business.

Issue: General reductions in greenhouse gas production

Recommendations:

1. Identify various solutions to reduce greenhouse gas emissions within our defined share of responsibility. These should include public education, improved efficiency for activities which produce greenhouse gases, energy conservation, fuel substitution and improved control technologies, including elimination at source, and enhancement of greenhouse gas sinks (e.g. forests).
2. Assess impacts on greenhouse gas production of any energy source policy especially where electricity could displace fossil fuels.
3. Use cost-benefit analysis to determine which strategies are most cost-effective.
4. The role of NO_x in ozone production is increasing and that of VOC decreasing. VOC control may not achieve major improvements, thus NO_x control may be more cost-effective.

Issue: Gaseous air emissions from the energy production and transmission sector

Some participants expressed concern regarding emissions from the coal, electricity, gas, petroleum, nuclear industries, especially SO_2, NO_x, but also H_2S, particulates, VOC and ozone.

Recommendations:

1. Reduce or limit emissions where they degrade the environment or affect ambient air quality as measured by national air quality objectives.
2. Establish a program which outlines reduction requirements and time frames.
3. Negotiate with the federal government to allocate regional emission caps based on the geographical extent of impacts (local, regional or transboundary).
4. Institute more effective emission and impact monitoring programs.

Issue: Pros and cons of cogeneration

The issue of cogeneration was raised in several discussions. While it was recognized that it is desirable in some cases for energy conservation purposes some participants were concerned that it could cause other air quality problems. Hog fuel and coal cogeneration are of particular concern.

Recommendation:

Cogeneration schemes should be fully assessed to identify net environmental benefits.

Issue: Waste management - landfills and incineration

Recommendations:

1. Some participants believe that energy bearing wastes such as tires can be substituted for conventional fuels in cement kilns with no increased impact on the environment. However, others oppose this practice, suggesting that more long-term studies on impacts are needed and that the public should be more involved in decisions on new technologies.
2. Landfill requirements should be reduced through waste reduction, composting and reduced disposal of recyclable materials.

3.6 Transportation Issues

Many workshops discussed transportation issues while treating other topics, since vehicles are associated with most economic activities (e.g. journey-to-work). Participants generally agreed on the need to reduce urban sprawl and vehicle dependence which leads to poor air quality and impacts on human health and the environment. "Cities need to be made liveable and sustainable."

Due to the size and traffic levels in Greater Vancouver, much of the discussion on transportation focussed on this region. It was suggested that vehicle emissions, especially from commuter traffic, will be reduced through change in both technology and lifestyle. Various measures were suggested, falling into two main categories:

- Reducing the total number of journeys made (e.g. car-pooling, van-pooling, telecommuting).
- Reducing the ratio of emissions per kilometre driven, focussing especially on emissions of greatest concern (NO_x, VOC) (e.g. more stringent emission controls, new technology).

Issue: Need for regional transportation planning

There has been steady growth in the GVRD in the number of vehicles on the road, total time and distance travelled, levels of traffic congestion and air quality deterioration. Participants agreed that better regional transportation planning is needed to create a network which is "properly integrated, minimally polluting and convenient".

Impediments to lifestyle changes include the present infrastructure (roads/densities), cultural expectations, the lack of affordable housing close to jobs, the belief that growth is inevitable or desirable, and the lack of transit alternatives. Yet, many positive suggestions were offered.

Recommendations:

1. Provide incentives for carpooling and vanpooling, including provision of high occupancy vehicle (HOV) lanes, preferred ICBC rates, parking preference at workplaces, and park'n ride lots.
2. Consider the use of carbon taxes and other incentives and pricing strategies to discourage single occupancy vehicles. (See examples from Southern California).
3. Encourage innovative changes in work habits, workplaces and business activities. For example, measures such as increased use of electronic information transfer can facilitate teleconferencing, telecommuting and nodal offices, and needs to be explored further.
4. Make employers responsible for transportation plans which provide incentives for public transit use and carpooling.
5. Institute a smog episode advisory to forecast anticipated problems and request voluntary action. This could be tied to the provision of free transit on "problem" days.
6. Develop disincentives to journeys to the downtown, including high parking downtown fees, a requirement for a bus pass to park in the city (as in Stockholm), free public transit and shuttle buses downtown.
7. Require that car distributors provide consumers with information on environmental benefits of different car models.

Issue: Using regional planning to reduce the need for transportation and associated pollution

Participants expressed significant interest in using municipal and regional planning to guide regional growth so as to reduce travel. They feel that development decisions should take into account transportation and environmental impacts. However, zoning, land-use and tax assessment

systems often make it difficult to use land use planning solutions to meet transportation goals. For example, it is difficult to achieve mixed use areas, particularly mixed residential and non-residential, due to tax assessment laws.

Recommendations:

1. Decentralize town centres and government office locations.
2. Promote the use of satellite offices and meeting areas outside the downtown.
3. Locate jobs close to transit.
4. Provide incentives for people to relocate closer to jobs.
5. Improve amenities downtown to make it more liveable and attractive to residents.
6. Include bicycles in future urban design.
7. Provide incentives to shop locally and disincentives to shop downtown (e.g. restricted parking).
8. Provide public education on the air quality implications of our current city forms (i.e. low-density sprawl).

Issue: Full cost accounting for the automobile infrastructure

It was noted that when transit is planned, all costs are taken into account, whereas the hidden costs of operating automobiles, such as highways, parking and environmental costs are not accounted for. This represents a hidden subsidy to "the automobile-based lifestyle".

Recommendation:

Government agencies should adopt full cost accounting for vehicle infrastructure when choosing transportation options and deciding on subsidies. Some auto subsidization should be switched to less polluting alternatives (e.g. bicycle infrastructure).

Issue: Need to reduce vehicle emissions

Participants identified various problems, including:

- unacceptable emission levels,
- lack of practical alternatives to current fuels, the internal combustion engine and travel modes,
- lack of affordable, "dedicated" vehicles (vehicles built for a particular fuel, rather than retrofitted, or those which are poorly maintained may not realize promised environmental benefits),

- high number of aging cars, which pollute more, and
- particulates, i.e. PM_{10} (less than 10 microns) primarily from vehicles, an emerging pollution source associated with respiratory problems.

Recommendations:

1. Adopt legislation to encourage the use of low-polluting, more fuel-efficient vehicles.
2. Tighten emission standards and enforcement for vehicles.
3. Encourage innovative measures such as a "beater" buy-back to get old cars that pollute off the road: this could be linked to emission trading such that industry will provide a market for old cars.
4. Use economic tools such as incentives for high mileage vehicles - (e.g. "sipper" rebates) and disincentives (e.g. "guzzler") taxes.
5. Include heavy duty and off-road vehicles in the recently announced B.C. vehicle inspection maintenance program.
6. Particulate levels need to be defined for the LFV with some quantitative analysis of composition.

Issue: Deficiencies in GVRD public transit

Many participants feel that the current transit system does not provide an adequate alternative to cars. Both large and small weaknesses in the current transit system were identified, including access limitations, long travel times, inconvenient scheduling and poor integration with various modes (e.g. Skytrain, bus, park'n ride and bicycles). Many suggestions were made.

Recommendations:

1. Increase and improve urban transit infrastructure and services, including rapid transit.
2. More subsidies may be needed to encourage transit use, but these costs should be compared with full-cost vehicle transportation (see above).
3. Transit-only and HOV lanes should be installed.
4. Urban transit agencies should expand their traditional role to include transportation management (e.g. encouraging car and van-pooling).
5. Provision should be made for bicycle linkages with transit (see "bicycle transportation" below).
6. Commuter rail systems are very desirable to urban and rural residents. Existing rail right-of-ways should be used.
7. New alternatives are needed to address transit needs in low density residential areas and deal with short trips.

Issue: Lack of attention to bicycle transportation

There was widespread support for encouraging greater bicycle use. It was noted that Vancouver has a bicycle advisory committee and a comprehensive bicycle plan, but participants felt that more initiatives are needed in Vancouver and at the regional level.

Recommendation:

Provide more "bicycle infrastructure" to encourage safe and secure bicycle use (e.g. bike racks, bicycle paths and lanes, bicycle access on Skytrain and secure storage at Skytrain, the Seabus and other transit nodes, covered secure parking for bicycles at workplaces, shower facilities at or near workplaces).

3.7 Forest Product Issues

Three main types of air impacts from forestry include local health and visibility, regional airshed quality and global climate change. (For more details, see the list of 37 issues in Appendix A, Forest Products Group 2.)

Issue: How does forestry affect the carbon cycle and global warming?

There is a lack of understanding of issues such as the linkages between forestry practices and the carbon cycle (e.g. carbon release from slow decay *vs* burning), carbon storage in the forest, and economic impacts of possible changes in forestry (e.g. job losses).

Recommendations:

1. Research the effects of various forestry practices and options on the carbon cycle. A public inquiry or public input into an analysis into forestry and climate change was proposed.
2. Educate the forest community and the public on the carbon cycle.
3. Encourage cogeneration as an option for improving energy efficiency, by minimizing conflicting regulations which prevent it. (Some participants are wary of cogeneration due to possible negative air quality impacts.)

Issue: Achieving ambient air quality standards in B.C. - determining acceptable emissions from forestry activity

Problems include whether air quality standards should be uniform across B.C.; the cost-effectiveness of alternatives; use of airshed management techniques; and differing meteorology, geography and air quality needs in each airshed.

Recommendations:

1. Improve the (topographic-controlled) air quality models and expand the network of meteorology and air quality stations.
2. Promote applied R & D on air pollution problems, opportunities and alternatives in the B.C. forest industry.

Issue: Burning - slash, teepee and land sort debris burning

Concerns include loss of the nutrient value of wood, underutilization of marginal fibre and soil impacts.

Recommendations:

1. Evaluate alternative practices and technologies re: slash burning to maximize efficiency and minimize environmental impacts. This analysis should address the nutrient value of soil, alternate utilization of marginal fibers and environmental impact.
2. Site research is needed to identify site-specific pros and cons of burning. Cost-benefit analysis of soil impacts may be useful.
3. Both large companies and efficient small-scale entrepreneurial operations should participate in finding alternatives to slash burning.

Issue: particulate emissions from forestry practices

Recommendations:

1. Define acceptable levels of particulates and incorporate these into law; review this definition regularly.
2. Adopt steps to ensure reduction of particulate emissions to an acceptable level.
3. Educate all groups re: causes and health effects of particulates.

Issue: Small scale wood burning for heat and power causes local pollution problems

Recommendation:

It was noted that environmentally sound technology exists for small scale heating and power. "Let's burn smart", said one group. Others suggested that open burning should be banned after alternatives are developed (e.g. chipping, composting).

Issue: Weaknesses in technical analysis

Some participants suggested that "big decisions are made based on fuzzy numbers", due to technical problems with pollution control. (1) sampling procedures need statistical validity, and (2) availability and use of dispersion model data is a concern.

Recommendation::

Improve technical analysis, monitor the validity of findings and make more and better data available.

3.8 Other Industrial and Non-Industrial Source Issues

Most of the issues discussed in the workshops on "other industrial sources" and "non-industrial sources" fall into the categories addressed in the previous sections (e.g. energy, standards and regulations). (See Appendix A for details on the discussions in those workshops).

Appendix A: Workshop Reports

The following are the full reports submitted by each workshop, slightly edited to enhance consistency, clarity and brevity. Brief summaries of the plenary discussions of workshop reports are also included.

1. Standards and Regulations

Standards and Regulations - Group 1

Facilitator: Bob Smith, Greater Vancouver Regional District
Rapporteur:

Problems:

1. No regulations on uncontrolled sources (e.g. small exhaust vents from paint shops, welding garages). There are controls on the same types of sources for major industries. These two are in conflict, resulting in unfair control and no control on small emitters in cities.
2. No adequate inventory and list of toxic pollutants.
3. Lack of scientific proof on toxic effects makes it difficult to develop standards and regulations.
4. Too much emphasis on "command and control" type of management rather than on prevention.
5. Not enough information and education on technical solutions to achieve prevention.
6. Conflicting policies among municipal, provincial and federal agencies. (e.g. you can pollute the air but get fined for a dog on the loose).
7. "Grandfather clauses" in legislation lead to different standards between industry groups.
8. No advance warning and consultation on future regulations and standards so that industry and municipalities can plan properly.
9. "Fuzzy" areas of responsibility among government jurisdictions.
10. Legislation and regulations made by people who are not the affected target group.
11. Need an airshed authority for the <u>whole</u> Fraser valley, not just the GVRD.
12. There is difficulty in policing and prosecuting polluters.
13. Not enough legal power to bring legal weight to enforce permits and regulations.
14. Citizens not legally empowered.
15. No public participation in setting standards.

16. Pollution control objectives are outdated.
17. Provincial and federal governments are slow to respond.
18. Ambient objectives don't recognize a mix of pollutants, only have individual pollutant standards.
19. Regulators have limited resources.
20. There are not enough technical education and experienced people involved in technical environmental decisions.
21. Ozone problem in the Fraser Valley. GVRD doesn't have the powers for regional planning and creating bylaws. They can only make recommendations.

Strategy/Actions:

1. Change legislation to allow for a Fraser Valley Authority (Upper/Lower Fraser Valley Regional Districts to join GVRD).
2. Make GVRD bylaws for enforcement as opposed to current permit process.
3. Need for public input on structure and operation of authority.
4. Should include emission fees (see 12).
5. Restore GVRD planning powers.
6. Coordination of business licence issuance to include environmental aspects of the business.
7. Other agencies/ministries should be involved (local and provincial health authorities, Agriculture, etc.). They should set environmental standards.
8. Provincial government should at least enforce present standards.
9. Should be the ability for citizens to sue for (i) public nuisance and (ii) to compel enforcement of laws.
10. Planning should encourage prevention of discharges and a move to zero discharges. This should be enforced. However, industry should have the freedom to implement processes to achieve these aims.
11. Ban open burning, but alternatives must first be developed (e.g. chipping, composting).
12. Individuals should be required to pay for use of the air resource, as well as industry (e.g. for use of fireplaces, vehicles, etc.).
13. Different agencies should provide for contact with the public (e.g. complaint line) on specific problems.
14. Upgrade provincial pollution control objectives and make them legally enforceable. Formal stakeholder input needed.
15. Transportation: Heavy duty and off-road vehicles should be included in recently announced B.C. vehicle inspection maintenance program. Emission standards and testing requirements should be implemented.
16. Develop an adequate list and inventory of toxic emissions and implement control programs. Better ambient air measurement technology is needed.

17. Ambient air standards should recognize pollutant mix (synergistic effects).
18. Transportation legislation:
    - high parking fees in downtown areas,
    - bus pass needed to park in the city,
    - free public transit, shuttle buses, and
    - zero emission automobiles, since autos still needed.
19. Industrial development offices should be decentralized.
20. Encourage working at home.
21. Rebate system - gas guzzlers should pay a fee; gas savers should get a rebate.
22. Mandate bicycle paths.

1. (a) Standards and Regulations

Standards and Regulations - Group 2

Facilitator: Morris Mennell, GVRD
Rapporteur: Tony Wakelin, B.C. Environment

Problem:

1. There is a lack of an adequate regulatory framework for British Columbia. Existing criteria are outdated and updating of these (e.g. industrial sources) is being done on an ad hoc basis.
2. There appears to be a lack of an overall mission for producing standards or regulations (i.e. we do not have a focus of where we want to go).
3. The relationship between Best Available Control Technology and ambient air quality: should technology dictate the standards? Are ambient levels appropriate?
4. There is a lack of staff resources within B.C. Environment to deal with issues, especially standards and emissions controls.

Goals:

1. To establish specific reduction targets for ambient and source air contaminants.
   - a phased in approach
   - working toward "zero" emissions (where an emission is defined as a released air contaminant that can adversely affect health).
2. To produce regulations that are clear, enforceable, comprehensive (i.e. cover all industries) and consistent across the province.
3. To have regular stakeholders review the regulatory process (e.g. an advisory panel).

4. To use Best Available Control Technology plus achieve ambient air quality standards; looking at considering technology and health. Note: there was some disagreement on this: How do we know ambient levels are appropriate? Should technology dictate emission levels?

Impediments:

1. Current judicial system (i.e. too slow).
2. Ability of government to respond:
   - bureaucracy,
   - time and communication lag for public opinion to reach the government.
3. Overlapping institutional/jurisdictional responsibilities.
4. Lack of resources.
5. Lack of information on costs of control *vs* public benefits.
6. Lack of public will - Inspection/Maintenance Program may bring this to light.

Priority Actions:

1. Develop a "Draft" Clean Air Strategy for the Province.
2. Get input and feedback from the public.
3. Fine-tune strategies for achieving goals for standards and regulations.
4. Obtain appropriate resource allocation.

Strategies:

1. Develop Air Basin Enforcement Agencies, where appropriate.
   - GVRD, Kelowna, Kitimat.
2. Integrated Planning
   - Set regulations in conjunction with transportation, land use, energy, population growth.

Key Linkages:

Transboundary Issues: Lower Fraser Valley - If either one of us does not clean up, we both lose.

1. (b) Standards and Regulations

Standards and Regulations - Group 3

Facilitator: Ed Wituschek, Environment Canada
Rapporteur: Ann Hillyer, West Coast Environmental Law Association

Problems:

1. Lack of air management strategy.
2. Difficult to identify realistic and appropriate standards.
3. Overemphasis on control and too little focus on prevention: need to anticipate problems.
4. No clearly defined process of permits, levels, etc.
5. Lack of rationale and clear process for development of standards and regulations.
6. Lack of enforcement and monitoring of requirements.
7. Inadequate environmental impact assessment (e.g. Province not committed to E.I.A., "Major Project" not well defined).
8. There is insufficient attention paid to prevention.
9. Lack of clarity re: jurisdictions and lack of coordination and priority setting between government regulatory agencies.
10. Lack of public education/information and public and industry consultation on development of regulations.
11. Problems created at local level when federal government signs international agreements.
12. Lack of clarity regarding this strategy process: what is being tackled and what is expected over the next 12 months?
13. Stakeholders need background information on approaches and issues (e.g. standards, control/prevention).

Goals:

1. Clear commitment from the Province to include multi-stakeholder input to develop strategy.
2. Clear targets which clearly define the end objectives and with an attainable timetable.
3. Ambient air quality objectives and guidelines to establish constraints on additions to an airshed.
4. A better way to set standards: a comprehensive process for development of regulations with multi-stakeholder consultation and provision of background information which provide the basis for the proposed regulations.
5. Periodic review and up-dating of regulations and objectives in view of new environmental requirements and technology.

6. Air quality management authority for Lower Fraser Valley with power to review land use/zoning development, etc. as it applies to air quality.
7. Clean air!

Priority Actions:

1. Targets for overall airshed reduction of greenhouse gases e.g. x % by 19--. This will include alternative energy and alternative technologies.
2. Bring all areas of the Province into compliance with existing standards.
3. Virtual elimination of toxic air pollutants.

Impediments:

1. Too much emphasis is now placed on the legal aspects of air quality rather than the technical side.
2. Lack of political will to address the real environmental issues.

Strategies:

1. Develop other tools besides regulations, such as process improvements, raw materials substitutions and incentives.
2. Public education kit: clear and concise information for communities about air problems and the strategy process.
3. Look at other jurisdictions for information and ideas (e.g. Alberta information kit).
4. B.C. should adopt federal guidelines as policy.
5. Examine health risk assessment.

Standards and Regulations - Plenary discussion issues:

There is a need for a clear timetable for a regional air management authority, preferably within one year; municipalities are ready now, but what will the Province agree to?

There is a need to treat air issues as urgent. Thus, a timetable should be set for all goals within the next 12 months.

Agencies should consider the costs of control technology in setting standards.

Re: grandfathering - Can you expect an industry to upgrade after building a plant with current Best Available Technology (BACT). Industry representatives say yes, the industry should anticipate tougher regulations

and technology changes into the next 15 years when designing plants. Grandfathering should be discouraged as it is a disincentive to this kind of strategic planning.

Need to control for greenhouse issues in a holistic way, so that other problems aren't made worse.

2. Economic Issues and Instruments

Facilitator: Peter Sagert, Cirrus Consultants
Rapporteur: Raymond Schachter, West Coast Environmental Law Association

Introduction

We see economic instruments as tools for implementing standards set by decision-making regulatory agencies. We define economic issues as the costs and benefits of pollution and the corrective measures and standards used to eliminate or control pollution. The following issues were discussed.

Issue # 1

How do economic issues impact on the decision-making process to determine clean air standards?

Goals:

1. Determine how the economic issues shall be used in the process, and
2. What forms of economic analysis are appropriate for the process.

Impediments:

1. Traditional economic analysis (i.e. benefit-cost analysis) is not sufficiently broad to incorporate all impacts of pollution, remediation or prevention.
2. Some benefits and costs are non-quantifiable (e.g. human suffering associated with public health or with closure of industry and lost jobs).
3. We must be aware and cautious that economic analysis must not be the sole determining factor in the decisions on standards. We must resist the desire to attach numbers to non-quantifiabie issues and then rely solely on the resultant economic calculations.
4. Weaknesses and limitations of scientific and medical knowledge.

Priority Actions:

1. To develop a systematic approach to the type of economic analysis which would be most beneficial to the decision-maker.
2. To ensure that economic analysis is (i) independent, (ii) incorporates input and concerns of all stakeholders through multi-stakeholder process, (iii) acknowledges scientific limitations, including the non-quantifiable impacts and scientific and medical uncertainties, and (iv) considers how the economic ramifications can be overcome or ameliorated by use of economic instruments.

Issue # 2

There is insufficient information available on the full range of instruments available for B.C. air quality control. We assume that more are being created as the field matures.

Goal:

To derive a resource base of information on economic instruments and a structure for how these will be applied to achieve regulatory requirements on a fair and equitable basis.

Impediments:

a. Lack of knowledge of instruments (as above).
b. Lack of knowledge of effectiveness of such instruments.

Priority Actions:

Create a working group with a proper mandate to research economic instruments and their effects, particularly taking note of other jurisdictions. The working group would determine where in the decision-making process the decision-maker must consider these tools and how principles of fairness and equity will be invoked. Instruments to be considered include green taxes, user fees, emissions trading (permits and quota), pollution charges, capital cost allowance, fines, subsidies, diversion credits, deposit systems, green funds and incentives.

Strategy:

Create working group to liaise with other working groups - need appropriate decision-making process with public involvement.

Issue # 3

Public education is of primary concern. Any overall clean air policy requires and demands public support and cooperation, especially if there will be substantial costs. This must be addressed now.

Issue # 4

Funding - who will pay the costs of such a strategy?

3. Energy Management and Planning

Energy - Group 1

Facilitator: Bob Caton, Concord Environmental
Rapporteur: Lenore Herb, Society Promoting Environmental Conservation

Problem # 1

Lack of a mechanism to coordinate all aspects of environmental impact assessments, not just environmental aspects, but also land use policies, energy policies, transportation, communications.

Goal: Establish above mechanism.

Impediments:

1. Lack of education of politicians and public.
2. What action is appropriate for a given level of knowledge about an issue.
3. Lack of visionary political leadership.
4. Barriers to rationalization of resource use decisions.

Priority Action:

Provide incentives to politicians for long term thinking.

Problem # 2

An economic strategy needs to be developed and then integrated with environmental strategies.

Goal: Not yet determined.

Impediments:

What is the cost of clean air? Damage *vs* abatement.

Strategies:

1. Polluter pay: taking into account the need for uniform international regulations.
2. Incorporate long term time frames in evaluation.
3. Energy conservation and efficiency must be related to a cleaner environment as well as the potential cost savings.
4. Account for full cycle, cradle to grave environmental and energy costs.

Problem # 3

There has been no clear statement of the goals and process to arrive at a "Clean Air Strategy" (i.e. Why is this an issue and what are the concrete outputs expected, including mechanisms and the results of our work?).

Goals/Solutions:

1. We need to connect global issues to local/provincial action.
2. Different strategies are necessary for different regions such as Lower Mainland, the Interior or the North.

Impediment:

Diverse regional definitions of "clean air", due to region-specific problems.

Problem #4

All long term energy resources and needs have not been evaluated and addressed. What are the sources and alternatives? How sustainable are supplies?

Goals:

1. More research and development.
2. Mechanisms to adopt more appropriate (non-polluting) technology.

Impediment:

Short-term thinking by consumers, industry, politicians.

Problem # 5

The adoption of a "Clean Air Strategy" has associated with it certain socio-economic and political impacts which we do not understand, especially how to mitigate or adapt to impacts (e.g. refinery closure in an economically developed area). What is the net socio-economic impact (cost-benefit) of "clean air" in B.C.?

Strategy:

Develop measures to identify impacts on specific areas of the labour force.

Problem # 6

There is a lack of full meaningful participative stakeholder involvement in the development of a "Clean Air Strategy" to date.

Goal:

Define affected stakeholders and design a process to allow them to make effective balanced input.

3. (a) Energy Management and Planning

Energy - Group 2

Facilitator: Murray Ward, Enviroscience Products (AWMA)
Reporter: Murray Ward

Introduction

The group identified the "duality" of the term "Energy". It can refer to the industrial sector that produces emissions, (e.g. fossil fuel production and transmission facilities and subsequent burning of fossil fuels within and outside B.C.) It can also focus on choices about energy sources and types, energy efficiency and conservation. These are all strategies which affect various emission sectors. The group chose to focus on two key problems.

Problem #1

Global Climate Change: two main issues were defined:

- production of greenhouse gases,
- political/policy problem: How will B.C. determine what its share of the problem should be (and, in the larger context, what Canada's share should be)?

Goals:

1. Negotiate with the federal government to determine a realistic share of our responsibility to limit greenhouse gas production. This should be achieved through consultation to help define items such as the evaluation methodology.
2. Identify technical solutions to reduce greenhouse gas emissions, within the realistic definition of our share of responsibility for the management of the problem.

Priority Actions (associated with the second goal):

1. Launch a major public education program to inform people of the issues, and what is within their power to change for the better.
2. Improve efficiency of any activity that directly or indirectly produces greenhouse gases (e.g. automobile fuel efficiency, commercial/residential lighting and HVAC loads).
3. Promote conservation of energy in all its forms. This is often linked with energy efficiency but also means planned reduction or elimination of energy use, separately from simply being more efficient.
4. Substitute lesser greenhouse gas producing fuels for more polluting fuels e.g. natural gas for petroleum products. This has application with both mobile and stationary sources.
5. Review practical greenhouse gas "control" technologies (i.e. elimination at source, or enhancement of greenhouse gas "sinks" such as increased urban green areas, reforestation).

Strategies and initiatives to enable these actions:

1. Provide incentives for the adoption of energy efficient or conserving actions and selection of renewable (soft) energy sources. (the "carrot" approach)
2. Require certain minimum levels of energy efficiency and conservation in appropriate regulatory codes (e.g. the Building Code). (The "stick" approach).

3. Promote R & D into energy conservation, energy efficiency and soft energy sources.
4. Assess environmental impacts related to greenhouse gas production, of any energy source policy (e.g. fuel substitution, especially when electricity), (which in B.C. is 95% hydro-produced), may be displaced by a fossil fuel).
5. Perform cost-benefit analyses on the menu of strategies to determine where you get the best "bang for the buck".
6. Review opportunities for technical transfer to third world countries of strategies/actions developed for B.C. Let's make a business of our skills, and at the same time help the developing world minimize their contribution to global climate change.
7. Ensure that all stakeholders receive information and are involved in air strategy development and prioritization.
8. Review strategy initiatives in other provinces, looking for "common ground" and good ideas.

Potential Impediments:

1. Difficulty in reaching agreements, externally with the federal government and internally with regional governments, industry and stakeholder groups.
2. Overlapping fed.-prov. jurisdictions and differing political priorities.
3. Agreement/acceptance of what our role is in the bigger worldwide economic and political situation.

Key Linkages:

It is vital that there be involvement at all stages of policy development by representatives of the following:

Provincial Government:

Federal Government: environment, energy, regional economic and industrial development, building standards
Round Table on Environment and Economy
Municipal Governments
Major affected industrial sources of greenhouse gases
Renewable and energy efficiency/conservation products and services sector
Environmental organizations (ENGO's)
Professional and Industry Associations: AWMA, West Coast Environmental Law, Professional Engineers Society, Assoc. of Energy Engineers (AEE), Canadian Environment Industries Assoc. (CEIA), Solar Energy Society (SESCI), Energy Management Taskforce, Canadian Earth Energy Assoc. (CEEA) and others.

Problem #2

Gaseous Air Emissions from the "Energy" Industrial Sector.
This sector was defined as including, but not limited to:

Petroleum production and refining
Natural gas processing and transmission
Coal production
Utility generation (electricity or steam) that involves combustion of fossil fuels or wood waste
Nuclear (in B.C. the concern would be transboundary)
Predominant pollutants of concern are SO_2 and NO_x but others include H^2S, particulate, VOC's and ozone (by subsequent chemical reactions of NO_x and VOC's). Discussion dealt generically with all these as regards ambient air quality and health. Specific attention was given to SO_2 and NO_x as they are the topic of national emission caps committed to internationally by the federal government.

Goals:

1. Reduce or limit emissions where they cause environmental degradation or affect ambient air quality as measured by national air quality objectives. (These qualifiers recognize situations that occur, for example, in remote regions, where energy production activities may emit substantial amounts of SO_2 or NO_x, but no significant acid deposition impact or air quality problems have been observed.)
2. Negotiate with the federal government to allocate emission caps on the basis of the previous goal (i.e. regional caps should be proportional to the seriousness of the environmental impact from their emissions; locally, regionally or transboundary).

Priority Actions:

1. More effective emission and environmental impact monitoring programs to identify significant sources.
2. Having identified the significant sources and determined necessary reduction requirements and time frames, embark on a program to realize the required results.

Strategies:

1. Every effort should be made to give equal view to prevention *versus* just control techniques (i.e. application of Best Available Prevention Technology (BAPT) rather than just BACT).

2. Similarly, conservation and efficiency measures should be reviewed for their positive contribution to emission reductions.
3. The same (as 2.) should be done for fuel substitution and choice of best fuels.
4. As regards national emission caps, the Province should carefully research and establish its position, and proactively communicate this through appropriate mechanisms (e.g. CCME).
5. A philosophy of least cost integrated resource planning should be practised.
6. Measures to manage emissions should not be limited to regulation, but should include the full spectrum of possibilities.
7. Stakeholder consultation is vital - we should draw on the expertise available within industry and permit the public to identify what is acceptable.
8. Airshed management is necessary (e.g. air management plans for specific regional air sheds).
9. R & D on both BAPT and BACT needs to be undertaken to assist industry.

Impediments:

1. Lack of clear understanding of the global political motivations re: the NO_x and SO_2 caps, and hence a tendency toward inaction at the local/provincial level.
2. Lack of accurate current data on both emissions and environmental impacts (i.e. the facts upon which to base the provincial position both re: national emission caps and local emission reduction targets).
3. Existing provincial policy and regulations may not be flexible enough to deal with the emerging issues.
4. Federal-provincial relations may inhibit implementation.

Key Linkages and Involvements:

Federal Government
Provincial Government: environment, energy, regional economic and industrial development
Major Industrial Sources
Professional and Industry Associations: as above
ENGO's

4. Transportation Management and Planning

Transportation - Group 1

Facilitator: Lorrie Adam, B.C. Environment
Rapporteur: Demming Smith, Society Promoting Environmental Conservation

Goals:

1. Improve air quality in the Lower Mainland: recognize that vehicle emissions are the primary cause of air pollution.
2. Reduce vehicle emissions, primarily from commuter traffic:
   - reduce number of journeys, encourage telecommuting, nodal offices.
   - reduce ratio of emissions/kilometre driven.
   - improve transit system.
3. Plan regional growth to avoid additional pollution:
   - consider transportation requirements, particularly for commuters, to control the number of additional vehicles and kilometres driven in the future,
   - introduce legislation to encourage the use of low-polluting vehicles, car-pooling, telecommuting, and
   - focus on emissions which impact most on air quality (NO_x, VOC's).

Strategies:

Emissions control will depend on technology as well as changes in lifestyle.

1. The use and application of electronic transfer of information needs to be explored further. Teleconferencing and telecommuting should be encouraged as a way to reduce vehicle trips to work sites. Provide tax breaks and incentives to encourage work at home.
2. Increase and improve urban transit. Infrastructure needs to be modified to encourage transit over single occupant vehicles. HOV or transit-only lanes should be installed. More subsidies to encourage transit use. Urban transit agencies should also help facilitate formation of carpools and vanpools as well as linking up with bicycles (TDM strategies).
3. Commuter rail systems around the urban area are very desirable to urban and rural residents. Existing right-of-way for rail should be utilized.

4. Legislation should be aimed at decreasing emissions. Carbon taxes and other incentives and pricing strategies to discourage single occupancy vehicles need to be mandated by government regulation. Other urban areas have done this type of thing with positive results. Southern California's Air Quality Management Disticts (AQMD) Commuter Program is a good example of legislation that discourages single-occupant vehicle trips.
5. Regional transportation planning needs to consist of more than simply building more highways. Development must start taking transportation and environmental impacts more seriously.
6. A regional planning body with greater authority over municipalities is necessary. Planning, development and transportation objectives must be integrated. The regional entity should have the same type of authority as Southern California Air Quality Management District. Needs ability to oversee development as well as transportation and air quality issues.

4. (a) Transportation Management and Planning

Transportation - Group 2

Facilitator: Paul Beauchemin, Western Research
Rapporteurs: Ken Bennett, District of Surrey; Nitya C. Harris, B.C. Buildings Corporation

Problem #1

Short-term management of emissions.

Goal:

Reduce emissions in GVRD by 50% by the year 2000.

Impediments:

1. Economic barriers:
   - when transit is planned, all costs are taken into account, whereas the hidden costs of operating automobiles are not accounted for, and
   - for vehicle inspection and maintenance program, needed repairs may not necessarily be done because of the cost to the car owner.
2. Lack of consumer information: consumers cannot consider environmental benefits associated with different models of cars.

3. Growth in number of vehicles on the road, increased travel time and distance and levels of traffic congestion.
4. Inconvenience of transit:
   - access limitations,
   - relatively long travel times as compared to cars, and
   - inconvenient scheduling.
5. Lack of alternatives: no real alternatives for fuel type, internal combustion engine and travel modes.
6. Number of aging cars: old cars pollute more.
7. Lack of affordable, "dedicated" vehicles: lack of vehicles built for a particular fuel, rather than retrofitted and/or maintained poorly and may not realize their promised environmental benefits.

Priority Actions and Strategies:

1. Public education and research: to provide consumers with the information to make choices that benefit the environment. Considerations are health costs, crop losses and other environmental damage, alternative fuel assessment. As well, to increase public awareness of auto emissions as the main source of pollution.
2. Full cost accounting for the automobile infrastructure (e.g. highways, oil companies, refineries).
3. Proactive transit strategy:
   - to provide improved levels of transit service, including rapid transit expansion programs,
   - to expand the traditional role of the transit agency to include transportation management (e.g. car and van-pooling), and
   - to address transit needs in low density residential areas.
4. Bicycle infrastructure: need bicycle paths, bicycle access on SkyTrain, covered secure parking for bicycles at workplaces, shower facilities at or near workplaces.
5. "Beater" buy-back: to get old cars that pollute off the road; possibly linked to emission trading such that industry will provide a market for old cars.
6. Tighten vehicle emission standards.
7. Smog episode advisory: to forecast an anticipated problem and to request voluntary action; this could be tied to the provision of free transit on "problem" days.
8. "Guzzler" tax and or "Sipper" rebate: economic incentives for high mileage vehicles (sippers).
9. Carpool incentives: provision of high occupancy vehicle (HOV) lanes, preferred ICBC rates, parking preference at workplaces, and park and ride lots.
10. Create positive associations.

Problem #2

Long-term management of emissions: urban design and lifestyle.

Problem definition:

Unsustainable urban design and travel patterns.

Goals:

1. Reduce urban sprawl and vehicle dependence.
2. Address human health problems.
3. Make cities more liveable and sustainable.

Impediments:

1. Cultural expectations.
2. Affordable housing close to jobs.
3. Belief that growth is inevitable or desirable.
4. Need for urban centres.
5. Flexible work weeks and work days: styles and schedules.
6. Present infrastructure (roads/densities).
7. Municipal planning guidelines.
8. Low energy costs.
9. Lack of transit alternatives/access.
10. People change jobs.

Strategies:

1. Regional planning subject to environmental assessments.
2. Encouragement to relocate (jobs, housing).
3. Location of jobs in relation to transit.
4. Decentralized town centres/government office locations.
5. Pilot programs: commuter reduction through teleconferencing, telecommuting, work schedules, home-based work.
6. Price and access to transit as well as safety.
7. Employer responsibilities (transportation plan, carpooling).
8. Bicycles included in future urban design.
9. Improved amenities downtown, more liveable.
10. Satellite offices/meeting areas.
11. Alternate transportation for short trips.
12. Encourage local shopping (parking restrictions).
13. Positive incentives/benefits.

Key linkages and involvements:

There should be coordination of agency roles and actions among the following agencies:

Ministry of Transportation and Highways
Federal Department of Consumer Affairs
Regional districts and municipalities
Vehicle management e.g. fleet managers
Education (curriculum)
B.C. Environment
Environment Canada
Ministry of Health
Research and technology development
Ministry of Tourism

5. Forest Products

Forest Products - Group 1

Facilitator: Vic Jensen, B.C. Environment
Rapporteur: -

Problems:

1. Burning: slash, teepee and land sort debris burning:
   - nutrient value of wood left is burned, research is needed to identify site specific pro's and con's of burning:
   - underutilization of marginal fibre, and
   - need for cost-benefit analysis on soil impact.
   - the role of the Ministry of Forests is a component which is missing from workshop deliberations,
   - small scale wood burning for heat and power is a problem: environmentally sound technology exists, and
   - "Let's burn smart."
2. Regulation: development of regulations, application and politicization problems; need for industry representation in development of policy and regulations. Also consider market motivation in controls (e.g. tradeable permits and licences).
3. Air pollution control: (i) monitoring validity of findings; sampling procedures need statistical validity, (ii) availability and use of dispersion model data is a concern. "Big decisions are made on fuzzy numbers."

Summary comments:

1. It is essential to increase stakeholder participation in the development of policy and regulations.
2. We recommend the evaluation of alternate practices and technologies re: slash burning in order to maximize efficiency and minimize environmental impact. The participation of efficient small-scale operations should be considered. This evaluation should take into account:
   (a) nutrient value of soil,
   (b) alternate utilization of marginal fibers, and
   (c) environmental impact.
3. The development of air emissions regulations must recognize that there is a need to maintain a competitive level playing field with other provinces and countries.
4. It is important to promote applied R & D on air pollution problems and opportunities in the B.C. forest industry.

5. (a) Forest Products

Forest products - Group 2

Facilitator: Dave Spittlehouse, B.C. Forest Service
Rapporteur: Gillian Booth, B.C. Environment

Issues:

Three kinds of air quality impacts:

1. Local health and visibility impacts of forestry practices.
2. Impacts on regional airshed quality.
3. Impacts of forestry practices on global climate.

Main Issues:

General

1. Get more detail before making decisions.
2. Analyse whole system rather than individual components.
3. Standard of living *vs* effects on environment.
4. People/customers becoming more interested in how industry is dealing with environmental issues.
5. Environmental education.

6. Public should have an "aware perspective" on forestry issues.
7. Need for better understanding among sectors.
8. Is government large enough to control the forest industry?
9. Industry is part of society and has a social conscience.
10. What mass of forest do we need for sustainable forestry?
11. What is the value of a forest: other uses of forestry - wildlife, recreation, fisheries.
12. Brazil 1992 meeting: possible impacts on forestry regarding amount cut.
13. If all areas were reforested, Canada could become a net carbon sink.
14. Headquarters support for enforcement of regulations.

Local

1. Health effects of emissions from mills (e.g. asthma).
2. Regulations on air quality regarding health effects are not being kept up-to-date.
3. Diesel logging trucks contribute to poor air quality.
4. Health and visibility effects of smoke from slashburning.
5. Slash burning regulations and implications.
6. Beehive burners and wood waste burning.
7. Incineration of waste and emissions.

Regional

1. Airshed as opposed to point-source pulp mill emissions.
2. Models to predict impact on airshed.
3. Uniform standards for air quality in all airsheds?
4. Waste management issues.
5. Co-generation.

Global

1. Climate change - possible change in river levels.
2. Political impacts of confusion of results of global climate models.
3. Effects of forest practices on the "greenhouse".
4. Forests as a source and sink of CO_2.
5. Global warming and ozone depletion effects on forest industry.
6. Climate change information and studies may not be reaching forest industry.
7. How to manage the risk of global warming and ozone depletion on forestry.
8. Reforestation practices should take climate change into account.
9. Require research into what we need in a living forest to reduce CO_2 emissions and maintain good air quality.

Category 1: Local impacts

Problem:

Particulate emissions from forestry practices.

Goal:

Reduce emissions to an acceptable level.

Impediments:

1. Education of industry and other groups on health effects of particulates.
2. Difficulty in defining "acceptable" levels of air quality re: health and visibility.
3. Slash burning: "We've always done it"; there is resistance to new methods. We do not know if it is cost effective.
4. Problems finding alternative waste wood disposal techniques.
5. Problems with alternatives to burning: should we use pesticides/herbicides instead?

Priority actions:

1. Define acceptable levels of particulate air quality and incorporate into law.
2. Regular review of this definition.
3. Education of all groups re: cause and health effects of particulate levels.

Category 2: Regional Impacts

Problem:

Achieving acceptable air quality from forestry activity.

Goal:

Meeting ambient air quality standards in B.C.

Impediments:

1. Cannot agree on whether the air quality standard should be uniform across the province.

2. Cost-effectiveness of the alternatives.
3. Management techniques for airsheds.
4. Different air quality needs in individual airsheds.
5. Different meteorology and geography of individual airsheds.

Priority actions:

1. Ensure range of options available to meet air quality standards e.g. emissions trading, new technology, airshed management concept.
2. Improve the (topographic-controlled) air quality models.
3. Expand network of meteorology and air quality stations.
4. Encourage co-generation by minimizing conflicting regulations.

Category 3 - Global Impacts

Problem:

How does forestry affect the carbon cycle and global warming?

Goal:

Minimize the contribution of the forest industry to global climate change.

Impediments:

1. Lack of understanding of linkages between forestry practices and carbon cycle.
2. Economic impacts of any necessary changes to forest practices (e.g. job losses due to reduced logging).
3. Little data available on carbon storage in the forest.

Priority actions:

1. Encourage research into forests and the carbon cycle.
2. Education on carbon cycle.
3. Improve communication of information among all interest groups.
4. Public inquiry into forestry and climate change.

Forestry - Plenary Discussion Issues:

We need to consider what can be done by both large forest companies and small entrepreneurial groups to find alternatives to traditional forestry practices, especially for slash burning.

If alternatives to slash-burning are needed, are there options for use of wood by-products other than energy production? The conversion of wood, cellulose, lignin to reusable products is an option, but the technology is not available.

We need to assess the forestry options based on some understanding of the entire carbon cycle (e.g. carbon release from slow decay *vs* burning). Also need to reconsider cogeneration regulations.

The response by government to local impacts of forestry practices is often inadequate. (Example: The Prince George Health Officer was seeking government response and possible research funding after documenting increased hospital visits related to local air pollution. Nothing was done by B.C. Environment or MOH. An B.C. Environment air quality meteorologist at the conference suggested that the issue was not as bad as originally thought, but recognizes that there are particulate problems and would like more information on TRS.)

6. Other Industrial Sources

Other Industrial Sources - Group 1

Facilitator: Marian Kim, Greater Vancouver Regional District
Rapporteur: Bruce Smith, Member AWMA

Introduction

Two major overall problems:

1. Need for environment-economy integration: including incentives, regulations, standards, technology, information and communications.
2. Decision-making and regulatory process: geographical and political inconsistencies in boundaries; need for industry, government and public to agree to a strategy.

Problem #1: Lack of Government/Industry/Community Process.

Goal: Cost effective air quality management.

Impediments:

1. Reallocation of resources.

2. Jurisdictional conflict.
3. Political will.

Strategies:

1. Establish an objective decision-making body for air management issues, composed of industry, government and public interest groups.
2. Develop a conceptual proposal.
3. Stakeholder acceptance.

Problem #2: Work Convention

Goal: Reduce transportation emissions from various industries.

Impediments:

1. Mind set/traditional thinking/inertia.
2. Technical feasibility.

Strategies:

1. Creation of internal environmental advocacy groups composed of employees and management.
2. Home/office development - telecommunications.
3. Location/relocation of office/industry near employee population.
4. Transit modifications.
5. Motivation: incentive packages, including tax incentives, equipment cost-sharing for industry.
6. Design facilities in the workplace to promote alternatives e.g. bike stands, showers, etc.

Problem #3: Global Warming - methane/CO_2 emissions.

Goal: Reduce greenhouse gas emissions.

Impediments:

1. Mind set/traditional thinking
2. Lack of acceptable alternatives.

Strategies:

1. Permit charges allocated to pollution abatement.
2. Landfill reductions through waste reduction and composting.
3. Public education.

7. (a) Other Industrial Sources

Other industrial sources - Group 2

Facilitator: Ed Chessor, Workers' Compensation Board
Rapporteur: Bill Hunter, Petro-Canada

Issues:

1. Ozone

- jurisdictions of sources does not extend to receiving areas;
- recipients have no control over emission sources;
- cause of ozone pollution: NO_x role increasing/ VOC's role decreasing;
- sufficient naturally generated VOC's may be present to combine with available NO_x. VOC control may not achieve major improvements in ozone concentrations; NO_x control may be more cost effective.

2. PM-10 (particulates less than 10 microns)

- an emerging problem - source is essentially automotive
- appears related to respiratory problems
- needs to be defined for LFV
- qualitative analysis on composition.

3. Global warming/CO_2

- uncertainties exist and there is a need for more knowledge.
- action is necessary but must be carefully thought out and applied in a cost effective way.

4. Incineration of wastes

- energy bearing wastes such as tires can be substituted for conventional fuels in cement kilns with no increased impact on the environment.

5. PAH's

- an emerging concern not confined to industry.
- control strategies must be applied to all sources e.g. wood stoves.

Goals:

1. Airshed management
   - involvement of generating and affected communities in decision-making process.
   - siting of emission sources must be considered.
2. Downroad consultation/involvement in strategy development, new acts/regulations/standards.
   - multi-stakeholder approach of consultations to develop strategy and acts, regulations and standards.
3. Include a long-range energy assessment in strategy development.
   - all parties, including industry, government and public must be prepared to take action to reduce pollution.

Impediments:

1. Lack of knowledge:
   - many issues are not clearly defined and must be further evaluated to allow for effective action.
2. Confrontation *vs* cooperation:
   - cooperative consultations such as this conference are the only way to advance understanding and problem-solving:
   - industry is part of the problem but has been and continues to be part of the solution; it will continue in that role, given the opportunity to participate in the process.
3. Past industry upgrading initiatives need recognition.

8. Non-Industrial Sources

Facilitator: Bruce Thompson, AES Environment Canada
Rapporteur: Anne Hulbert, City of Port Moody (Lynn Ross, B.C. Gas)

Priority Issues:

1. Ozone/smog

Impacts: health effects, crop loss, material/structural, damage, reaction re: tourism, loss of productivity, human and otherwise.

Sources: photochemical processes, motor vehicles, solvent-based industries, refineries, cement plants, Burrard Thermal, asphalt roofing and roads, heating plants - boilers, fireplaces, biogenics, landfills, residential sources: lawnmowers, BBQ fluids, combustion, planes, boats, trains, gasoline marketing, domestic personal care products.

2. Global climate change

Impacts: coastal inundation, flooding/drought, energy consumption pattern changes, forest industry: changes in growth, pest patterns, species, fishing changes, agricultural crop changes, ecological refugees/population increases, other unknown changes.
Sources: CFC's, biomass burning: wood waste, trash.

3. Ozone layer depletion

Impacts: skin cancer and other human health effects, plant damage, unknown.
Sources: CFC's, halocarbons, space exploration vehicles.

4. Toxic air pollutants

5. Visibility

Impacts: tourism, aesthetics/perception, transportation safety, orientation difficulties.
Sources: wood burning, PAH/ozone, diesel particulates, road dust and particulates, water vapour, biogenic, cement plants/coal burning, bulk material handling, beehive burners.

Goals:

1. Reduce issues to lowest possible impacts using best available technology.
2. Internalize environmental costs.
3. Encourage technological innovation.
4. Educate at all levels.
5. Find solutions which do not create new problems.
6. Weigh out solutions - environmental accounting.

General Solutions:

1. Education and information .
2. Appropriate application of technology.

3. Community planning which explicitly recognizes transportation structures, protects family unit.
4. Legislation (interagency - airshed management).
5. Lifestyle change
6. Market incentives: carrot approach, government support, leasing approaches.
7. Integrated, diversified transportation.
8. Add environmental costs to development.
9. More research to provide understanding of environmental impacts.

Priority Actions:

1. Very tight emissions standards/enforcement for vehicles.
2. Transportation planning - properly integrated, minimally polluting, convenient.
3. Independent (non-government) group to coordinate/fund/ disseminate environmental studies;
   - must include entire LFV airshed;
   - mandatory role in planning/permitting processes; and
   - similar groups for other priority airsheds.
4. Enforced emission targets.
5. Initiatives to reduce the disposal of recyclable materials.
6. Add environmental costs to development.
7. Research to provide understanding.

Impediments:

1. Poorly informed politicians and public.
2. Industrial inertia.
3. Lack of environmental knowledge.
4. Lack of non-partisan sources of information.
5. Lack of coordinated overview.
6. Special interest lobbying groups.

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Appendix C: Background Information From Conference

The following information is provided as additional background for discussion groups. The information provided here includes:

- **Issue Importance Rating***
- **Discussion Groups, Reporting & Process***
- **Outline for Discussion Groups***
- **General Discussion Questions***
- **Air Quality Objectives**
- **Local and Regional Issues***
- **BC Emissions**
- **Initatives Underway***
- **Conference Working Groups**

* Your comments are welcomed, and specifically sought on the items marked above.

Issue Importance Rating

The workshop component of this conference is vital in ensuring that there is an opportunity for you to share your thoughts and feelings about the issues of importance in developing a B.C. Clean Air Strategy. In order to know how you and your fellow workshop participants see the subject area you will be discussing, please indicate your perspective of the relative level of importance of each of the issues on the checklist below in relationship to the subject area of your own discussion group.

	10 Very Important	1 Unimportant
Global climate change	x	x
Ozone layer depletion	x	x
Acid deposition	x	x
Ozone smog	x	x
Gaseous pollutants (NOx, SOx, CO, other)	x	x
Hydrocarbons (VOC)	x	x
Particulate (TSP, PM10)	x	x
Toxic air pollutants	x	x
Odorous air pollutants	x	x
Visibility	x	x

Additional Comments: _____

_____

_____

Please complete and return to the conference facilitator. This information will be collated overnight, and returned to you tomorrow. Please indicate which group you are attending, so that we can use your information, and your name, so we will be able to return this to you.

Name: _____ Workshop: _____

Discussion Groups, Reporting & Process

- To the greatest extent possible, participants are placed in the discussion group which they indicated as their first choice.
- Each discussion group will have a volunteer facilitator from either AWMA, Environment Canada, the BC government, or the GVRD.
- Each discussion group will choose its own reporter to the plenary session. The conference facilitator, Ray Penner, will provide guidance on this role.
- A conference report will be produced and provided to all participants. It will include a summary from each of the speakers, the questions and panel discussions on April 30th, and the plenary session on May 1st. The reports of the discussion groups will be retained by the consultant and BC Environment. The general conference reporter is Susan Abs.
- Comments on the conference and subsequent process to develop a Clean Air Strategy are welcome. Comments are welcome in (almost) any form, but in order to ensure that your comments are accurately recorded, you are encouraged to provide comments in writing to the conference facilitator. Further information on process will be provided at the conference.

Comments on Process:

_____

_____

_____

_____

_____

(OPTIONAL) **Name:** _____

Outline for Discussion Groups

The following outline is suggested for preparing for the discussion group process.

Problem Definition

Goals

Impediments

Priority Actions

Strategies

Key Linkages and Involvements

General Discussion Questions

The following questions are posed in the background paper 'Air Quality Issues in British Columbia', prepared for the British Columbia Round Table on Environment and Economy.

- Do we need airshed ambient standards and target loadings to know when we are achieving sustainability?
- Do we need more up-to-date emission standards, and more comprehensive proponent data, so that proposed developments may be thoroughly assessed in the review process?
- Do we need regional air management authorities to deal with air quality management in large-scale airsheds?
- Do we have adequate processes and policies for dealing with current problems, such as wood waste burners and regional ozone, which may serve as models for the future?
- Should B.C. consider a strategy for preventing significant deterioration of existing air quality in areas of the province which are currently undeveloped or developing?
- Should B.C. lead the way in managing emissions which contribute to global problems, or should we participate as required in national programs?

Several additional questions were suggested by the pre-conference working groups:

- What should be the relative roles of technology standards and economic measures (such as emissions trading, taxes and incentives) in managing air contaminant emissions?
- How should international agreements to manage emissions be reconciled with difficult economic circumstances?

There are many additional questions which can be posed; others will emerge at the workshop, and you are encouraged to record them in your discussion group report.

Air Quality Objectives

Air quality problems are often defined in relation to air quality objectives or standards. In Canada, national ambient air quality objectives have been established under the provisions of the Canadian Environmental Protection Act. The ambient air quality objectives used by B.C. Environment and the GVRD are generally similar to the national air quality objectives.

The national air quality objectives cover major air contaminants, and are defined in terms of three levels:

Maximum Desirable (Level A): Defines the long-term goal for air quality and provides a basis for an anti-degradation policy for the unpolluted parts of the country and for the continuing development of control technology.

Maximum Acceptable (Level B): is intended to provide adequate protection against effects on soil, water, vegetation, materials, animals, visibility, personal comfort, and well-being.

Maximum Tolerable (Level C): are time-based concentrations of air contaminants which require appropriate action without delay to protect the health of the general population.

Local and regional air quality concerns arise when air quality objectives are exceeded, typically during conditions of unusually high pollution emission, or meteorological conditions which limit pollution dispersion. In British Columbia, the trapping of pollutant emissions by rugged topography also contributes to local and regional air quality problems.

Aesthetic concerns, such as odorous emissions, are not reflected in the objectives described above, but are typically regulated by municipal nuisance bylaws. While such ambient air quality objectives provide a good yardstick for assessing most regional and local air quality issues, they are inadequate to deal with acid deposition, or global concerns such as CFC and halon release, and greenhouse gas emissions.

Air Quality Index

In several parts of British Columbia, an Air Quality Index is used to provide a convenient summary of ambient air quality information. These Air Quality Index values are calculated by comparing measured air quality to objectives. In the AQI system used in most of Canada, index values are calculated for a number of measured pollutants at a single station, and the highest single

index is reported. Current knowledge of pollutant interactions is inadequate to allow calculation of a combined index for all pollutants together.

In the Lower Fraser Valley, AQI values are calculated from a minimum of three of the following pollutants: nitrogen dioxide, sulphur dioxide, ozone, carbon monoxide, and fine particulate. In Prince George, a local index value is reported for total reduced sulphur.

Local and Regional Air Quality Issues

A few of the local and regional air quality issues which are currently being evaluated in British Columbia include:

- Summer ozone episodes in the Lower Fraser Valley
- Acid deposition in southwestern British Columbia
- Carbon monoxide (CO) levels during calm, winter conditions
- Total reduced sulphur (TRS) levels in some communities near pulp mills
- Sulphur dioxide (SO2) concentrations adjacent to some industries
- Smoke management, particulate and visibility issues, including biomass burning from teepee burners, residential woodstove use, and open burning such as forestry slash burning

Other Issues you feel are important:

_____

_____

_____

_____

(OPTIONAL) **Name:**_____

British Columbia Emissions

The summary information presented below shows current emissions of NOx and VOC, and forecast emissions for the year 2005, based on continued implementation of approved control programs for all source sectors. NOx and VOC emissions contribute to the formation of ground-level ozone smog. The information is from the Draft CCME NOx /VOC Management Plan for Canada.

Nitrogen oxide (NO_x) Emissions - kilotonnes (as NO_2)

Sector	British Columbia		Canada	
	1990	2005	1990	2005
Transportation				
Cars	37.5	19.4	250.4	149.8
Light-duty trucks	13.9	11.7	93.3	88.4
Heavy-duty trucks	47.1	30.3	335.5	260.8
Off-road diesel	56.1	69.1	359.7	430.4
Other	8.2	9.2	82.7	90.6
Fuel combustion				
Residential	3.2	3.3	37.3	36.9
Commercial	2.6	2.9	25.9	28.4
Industrial	35.4	47.9	331.6	384.1
Power Generation	1.0	1.2	289.6	351.7
Industrial Processes	12.1	16.7	89.9	139.7
Incineration/other	11.1	13.7	27.2	34.6
TOTAL	228.2	225.4	1923.1	1995.4

Volatile Organic Compound (VOC) Emissions
- kilotonnes as non-methane hydrocarbons

Sector	British Columbia		Canada	
	1990	2005	1990	2005
Transportation				
Cars	52.2	35.5	334.0	237.3
Light-duty trucks	19.7	14.8	130.0	112.6
Heavy-duty trucks	6.8	6.1	40.3	47.8
Off-road gasoline	5.2	5.7	64.8	74.3
Other	13.3	17.0	76.1	89.0
Fuel combustion				
Fuelwood	4.3	5.0	111.8	132.7
Residential/Commercial	0.3	0.3	3.5	3.5
Industrial	39.2	55.8	46.0	63.9
Power Generation	0.3	0.3	2.7	2.7
Industrial Processes	16.3	22.4	162.3	239.4
Surface Coatings	22.6	25.2	207.5	253.6
Fuel Marketing	11.6	11.4	109.0	124.4
Dry Cleaning	1.7	1.8	14.5	15.5
Solvent Use	32.0	34.3	314.0	333.8
Slash Burning	40.2	57.4	89.8	129.0
Other	8.2	11.5	25.7	32.4
TOTAL	273.9	304.5	1732.0	1891.9

The following emission inventory data for sulphur dioxide and particulate matter is Environment Canada data for 1985.

Particulate Matter and Sulphur Dioxide (SO_2) Emissions for 1985 - kilotonnes

Sector	Particulate matter		Sulphur Dioxide	
	B.C.	Canada	B.C.	Canada
Transportation				
Cars	4.1	43.3	1.1	10.6
Light-duty trucks	1.6	11.0	1.3	5.8
Heavy-duty trucks	4.4	21.5	3.7	20.4
Off-road diesel	3.6	20.5	3.5	14.9
Other	1.6	14.2	2.3	43.3
Fuel combustion				
Residential	0.3	4.6	2.1	31.6
Commercial	0.2	2.7	1.7	23.6
Industrial	51.0	107.9	12.4	176.7
Power Generation	0.3	99.9	0.4	737.7
Industrial Processes				
Mining	63.3	201.1	-	-
Chemical pulping	27.4	115.0	16.7	60.2
Coal	71.2	165.4	-	-
Gas plants	-	-	20.6	265.6
Petroleum refining	0.7	8.8	13.8	74.0
Aluminum	4.4	19.0	3.8	22.8
Lead/zinc	-	-	17.0	123.1
Sawmills	9.9	39.4	-	-
Other	33.7	361.5	3.6	2027.2
Incineration	22.3	38.1	0.3	1.7
Slash Burning	100.1	219.6	-	-
Other	13.5	215.5	0.8	47.5
TOTAL	413.6	1709.0	105.1	3986.6

Carbon dioxide is not considered a pollutant at ground level, but it is of concern as a greenhouse gas. The following inventory data were published in May of 1990 by the B.C. government; inventories for other greenhouse gases are currently being developed under contract.

Carbon dioxide (CO_2) Emissions - kilotonnes

Sector	British Columbia	
	1988	2005
Transportation	17,412	22,764
Stationary sources		
Industrial	29,443	34,237
Power Generation	1,133	6,050
Other	10,457	15,247
Industrial processes	3,239	3,827
Solid waste disposal	9,396	7,283
Slash Burning	13,300	9,300
TOTAL	84,380	98,708

Initiatives Underway

CCME NO_x/VOC Management Plan

The Plan has two major objectives:

- to meet Canada's international obligations to control NO_x emissions
- to reduce low elevation ozone smog in three problem regions

The CCME Plan outlines some 30 national initiatives in the areas of:

- energy conservation and product control
- consumer choice and lifestyle
- emission source control

Three ozone problem areas, including the Lower Fraser Valley, are targetted for an additional 30 actions. The Plan estimates government resource requirements of $10 million over 5 years in B.C., with annual implementation costs to B.C. emitters rising to more than $90 million by 2005.

CCME CFC Elimination Strategy

The Strategy is designed to meet the goals of the revised Montreal Protocol, namely, elimination of CFC's by 1997. The Strategy defines federal and provincial roles: the federal responsiblity is chiefly in preventing new CFC's from entering the marketplace, while the provincial responsibility is chiefly in the management of the existing supply of CFC's. Responsibilities for public education, research and other other tasks are also defined.

B.C. is committed to develop and implement a CFC/halon control strategy to achieve the goals of the Canadian Ozone Layer Protection Program. Necessary actions include:

- Incentives for recovery and recycling
- Inventory and tracking system
- Standards and codes of practice
- Education and communication
- Destruction of CFCs

CCME SO_2 Cap

A national SO_2 cap of 3.2 million tonnes per year was sought to support negotiation of a US/ Canada clean air agreement. The recently signed agreement includes a permanent Canadian cap, to be achieved by the year 2000.

A cap on SO_2 emissions may require use of advanced pollution control technology on new facilities and retrofit requirements for existing facilities, in order to accommodate future growth in B.C. A regional cap may not resolve local problems, and will not address transport of emissions from the U.S., both of which are believed to occur in southwestern British Columbia.

British Columbia participated in the development of a recently released report to the Western LRTAP (Long-Range Transport of Air Pollutants) Committee to analyze the sensitivity or 'acidifying potential' of soil and water bodies. Further work is required before this approach can be applied in regions of high precipitation such as coastal British Columbia.

CCME Global Climate Change Strategy

The CCME draft National Action Strategy on Global Warming proposes a phased approach to stabilization, in which the first phase would include actions which are economically viable, or assist in the achievement of other policy goals, such as CFC elimination.

The strategy will have significant implications for British Columbia, including:

- Limiting greenhouse gas emissions as soon as possible.
- Taking action to improve scientific understanding and examine more far-reaching measures, including assessment of cost-benefits and socio-economic implications.
- Assessment of the potential impact of climatic change on resource sectors, and examination of options to minimize effects. Significant effort will be required in order to develop a more detailed understanding of potential implications within B.C.

Vehicle emission inspection/maintenance was recently announced for the Lower Fraser Valley. The program will reduce vehicle emissions which contribute to regional air quality problems. (B.C. gov't)

GVRD's "Creating Our Future: Steps To A More Livable Region" contains a number of recommendations designed to ensure good future air quality. These recommendations build on GVRD's ongoing air quality management activities.

The "Go Green" program promotes the use of transit and ridesharing, and has increased public understanding that transportation is the major source of air pollution. (B.C. Transit, GVRD, Environment Canada and Ministry of Transportation and Highways).

The "Clouds of Change" report focusses on transportation management strategies and land-use planning to mitigate regional and global air quality issues. (City of Vancouver)

The "Fuel Smart" program provides initiatives that will conserve energy and reduce emissions. (Ministry of Energy, Mines and Petroleum Resources)

Woodwaste cogeneration projects are planned in a number of locations to produce electrical energy, and reduce emissions from teepee burners.

BC Hydro has carried out fleet vehicle emission studies to consider options to reduce emissions.

BC Gas has developed a program to convert vehicles to natural gas fuel, and develop private sector fuelling infrastructure.

Gasoline vapour emissions are being reduced in a cooperative program between the petroleum industry and government.

Ballard Fuel cell research in North Vancouver is developing a fuel cell that uses either hydrogen or natural gas to provide an electric current to power electric motors. A demonstration bus powered by a fuel cell is under development.

Other Initiatives that you are aware of:

_____

_____

_____

_____

_____

(OPTIONAL) Name: _____

CONFERENCE WORKING GROUPS

(Chair underlined)

Steering Committee

Murray Ward	BC & Yukon Chapter - AWMA
Don Fast	BC Environment Environmental Protection Division
Barrie Mills	GVRD Air Quality and Source Control
Kirk Johnstone	Environment Canada - Atmospheric Environment Service
Hu Wallis	BC Environment - Air Management Branch

Conference Logistics

Murray Ward	BC & Yukon Chapter - AWMA

Conference Program Coordination

Hu Wallis	BC Environment - Air Management Branch
Rick Wilson	BC Round Table on Environment & Economy
Douw Steyn	University of BC - Atmospheric Sciences

Conference Facilitator

Ray Penner	Strategic Action Consultants

Conference Rapporteur

Susan Abs	Susan Abs & Associates

Global Issues Working Group

Eric Taylor	Environment Canada - Atmospheric Environment Service
Ken Stubbs	Greater Vancouver Regional District
Gordon McBean	University of BC - Atmospheric Sciences

Regional Issues Working Group

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Lorrie Adam	BC Environment - Air Management Branch
Bruce Thomson	Environment Canada - Atmospheric Environment Service
Demming Smith	Society Promoting Environmental Conservation
Warren Bell	Ministry of Energy, Mines and Petroleum Resources

Local and Industrial Issues Working Group

Morris Mennell	Sandwell Inc.
Al Brotherston	BC Hydro
Kamal Bhattacharyya	BC Environment
Ed Wituschek	Environment Canada
Al Chmelauskas	MacMillan Bloedel
Jon Pilsbury	MacMillan Bloedel
Michael Jordan	Canfor
Rod Elliott	CCPA
Glen Meyers	CPPI
Jim Swiss	CPA
Ray Romaniuk	Tilbury Cement
Chandra Shekher	Lafarge Canada
Roger Berdusco	Coal Association of Canada
Mark Thorpe	BC Mining Association
Lorne Marche	Vancouver Board of Trade
Miranda Holmes	Greenpeace
Dermot Foley	SPEC
Ann Hillyer	West Coast Environmental Law Association

Appendix D: Seclected Reading

A Perspective on Transboundary Environmental Issue, Concord Environmental, Prepared for the British Columbia Round Table on the Environment and the Economy, Victoria, December 1990.

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Air Quality in British Columbia, British Columbia Ministry of Enivronment, Victoria, October 1989.

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Canadian Perspectives on Air Pollution: A State of the Environment Report, Environment Canada, Ottawa, September 1990.

Climate Change Digest: The implications of Long-Term Climatic Changes on Transportation in Canada, Environment Canada, Downsview, 1990.

Clouds of Change: Final Report of the City of Vancouver Task Force on Atmospheric Change, City of Vancouver, Vancouver, June 1990.

Creating our Future: Steps to a more Livable Region, Greater Vancouver Regional District, Burnaby, September 1990.

Decision-Making Processes and the Energy Sector, G.E. Bridges, Prepared for the British Columbia Round Table on the Environment and the Economy, Victoria, June 1990.

Go Green: Go Transit of Carpool, B.C Transit, Environment Canada, British Columbia Ministry of Transportation and Highways, Greater Vancouver Regional District, Lower Mainland.

Literature Review on the Greenhouse Effect and Global Warming, by M. English, R.K.W. Wong, and B. Kochtubajda, Alberta Research Council, Edmonton, August 1990.

Management Plan for Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOCs) Phase I, CCME-EPC/TRE-31E, Winnipeg, November 1990.

Management Plan for Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOCs) Phase I Summary, CCME-EPC/TRE-32E, Winnipeg, November 1990.

PolicyMakers Summary of the Scientific Assessment of Climate Change, Intergovernmental Panel on Climate Change, Bracknell UK, June 1990.

Transit and the Environment, B.C. Transit, TransVision Consultants, Vancouver, April 1990.

FOR FURTHER INFORMATION:

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